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TO ADVANCE THE SCIENCE, PROCESSES, AND ART OF PUBLIC ADMINISTRATION

PUBLIC ADMINISTRATION REVIEW: GOALS AND STANDARDS—

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in this number

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Government by Contract: Boon or Boner?

By VICTOR K. HEYMAN

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Great revolutionary changes by their color and dramatic visibility force us to examine their causes, effects, and implications. In most cases, however, change is so gradual that it often passes unnoticed by most of us until some observer points out that the total impact of the slow change has become so great that we are all affected. Administration by contract in the federal government is one of these gradual changes. The author shows that its problems and benefits need much more study and discussion than we have given them, since this method of administration has significant implications for many facets of our life in addition to public administration.

THE time appears to be rapidly approaching when the employees of the federal government, like the classic iceberg, are nine-tenths "invisible." Even today, a rough estimate of federal employment would be in the neighborhood of eleven million workers, only five million of whom are direct military and civilian federal employees.[1] The remaining workers are obtained by means of contracts, grants, and similar instruments.

Much is known about the problems of administering the regular government agencies, but very little is known about administering the large numbers of people and activities brought into the federal service by contract. In this paper we are concerned with the benefits and problems of the latter; that is, the problems of control, economy, and policy and the benefits obtained by contracting with "private" institutions for services of an administrative, managerial, or scientific nature. We will take for granted that the federal government needs the services under study.

Extent of Contracting Out

Before the problems and benefits to the government of contracting for services can be intelligently grasped, it is necessary to provide some information as to the extent of such contracting. The major portion of it is for research and development, weapons systems management, and technical supervision of weapons programs, although considerable amounts of contracting are for the management and operating of government-owned facilities, management analysis and similar consultant services, educational activities, foreign technical assistance, and miscellaneous other services.

Research and Development

The trend throughout the government is toward increased contracting for research and development. In general, there are three major types of research and development programs.[2] First, the government finances research which is of the contractor's choice—generally of a basic or fundamental nature and generally with universities.

In the second category of research contracts are those in which the government goes to the contractors for research designed to solve particular problems arising in the agency's performance of its mission.

Finally, there are the research and development contracts calling for the contractor to manage and operate government-owned facilities. These will be discussed later.

NOTE: This article is based on work performed by the author for the Brookings Institution and a paper delivered by him at the 1960 Annual Meeting of the American Political Science Association.

[1] This figure is obtained by means of the following equation: gross federal expenditures are to gross national product as gross federal employment is to total U.S. employment. Thus $80 billion/$480 billion equals 11.17 million federal employees/67 million workers. Admittedly this is only a very rough estimate.

[2] This tri-partite categorization of research and development contracts is taken from National Science Foundation, *Government-University Relationships* in Federally Sponsored Research and Development (NSF 58-10, 1958), p. 9.

In all, more than thirty agencies and departments of the federal government contract for research and development. The federal government in fiscal year 1960 spent by way of this kind of contract 77 per cent of its $7.7 billion research and development funds, in 1959 it was 76 per cent and in 1958 it had been only 74 per cent.[3] Considering that the total amount of money allotted for research and development has been climbing rapidly, the money spent on research and development contracts has grown significantly both in total size and in percentage.

Weapons Systems Management and Technical Supervision

The military departments have had an extremely difficult time deciding on the most appropriate way to integrate military requirements and control with industrial planning and organization. At one extreme was the Army's use of its own facilities and know-how to take the Redstone and Jupiter missiles from basic requirement through the production of prototype missiles. At the other extreme was the "weapons systems management" concept which, as conceived in 1952 by the Air Force Research and Development Command (ARDC), put onto a single contractor the full responsibility for designing and producing a complete weapons system ready to perform its specified function.

Between these two extremes many other ways of integrating industry and the military have been attempted. The Navy has four major patterns of industrial relations ranging from the Air Force weapons systems management concept to almost the Army's arsenal concept. In any case, it is clear that the military has contracted for a wide range of functions which give the contractors tremendous power.

The list of non-industrial type facilities owned by the government and managed and operated by private contractors is large and growing. The military departments and the Atomic Energy Commission have made the most use of such contracts, but other agencies also use them. This type of arrangement overlaps to a considerable extent the contracting for research and development, since under the latter practice, the government may also provide rent-free facilities for the use of the contractor.

Management Analysis and Consultant Services

The government obtains the services of all kinds of experts by means of contracts. The Defense Department has used extensively such contracts.[4] Departments and agencies have contracted with private firms to come in, review the operations or prospective operations of the agency, and to tell it how it should be organized, what its accounting or cost analysis system should be, what electronic equipment it ought to have. Contracts have also been given for the teaching of courses in management analysis, the establishment of procedures for prediction of supply and demand for agency services and/or materials, and the analysis of industrial facility availability and private management competence for undertaking government work. These contracts are comparatively small, ranging normally in five and six figures and let on a negotiated fixed price basis with redetermination permitted.[5]

The so-called "think groups" are usually classified as consultant-type services. The Air Force established the first of these groups, the RAND Corporation. RAND started with five people; it now has more than 800. Its first contract in fiscal year 1948 was for $2,750,000, and its fiscal year 1960 contract was approximately $13,500,000. Groups similar to RAND include the Operations Research Office, Johns Hopkins University (Army); MITRE Corporation (Air Force); Institute for Defense Analysis (Department of Defense); Human Relations Research Office, George Washington University (Army); and the Naval Warfare Analysis Group and Operations Evaluation

[3] National Science Foundation, *Federal Funds for Science, VIII.* The Federal Research and Development Budget, Fiscal Years 1958, 1959, 1960 (NSF 59-40, 1959), pp. 46, 48, 50.

[4] U.S. House, 86 Cong. 2 sess., Committee on Appropriations, Hearings before the Subcommittee . . . on *Department of Defense Appropriations for 1961,* pt. 7, pp. 175-85.

[5] U.S. House, 85 Cong. 2 sess., Committee on Post Office and Civil Service, Hearings before the Subcommittee on Manpower Utilization . . . on *Manpower Utilization in the Federal Government,* p. 283. Especially useful here is U.S. House, 86 Cong. 2 sess., Committee on Appropriations, Hearings before the Subcommittee . . . on *General Government Matters Appropriations for 1961,* pp. 144-67.

Group, Massachusetts Institute of Technology (Navy).

Educational Services

Educational services are more and more required by the federal government. Frequently these are obtained by direct hire procedures, but there appears to be a trend toward hiring educational institutions on a cost-reimbursement basis, with or without profit. Although there are no exact figures available, educational services obtained by contract probably cost more than $5 million a year.

Technical Cooperation

Another important area of contracting is that for technical cooperation services. ICA let contracts totaling more than $63 million of its $303 million project assistance budget for fiscal year 1960 for educational and technical services. More than 44 per cent of the technicians working abroad on this program are contractors' employees. As of March 31, 1959, fifty-two universities were providing Point Four educational assistance abroad. Numerous other private profit and nonprofit institutions have provided services of various types for ICA.[6]

Problems and Benefits

Benefits

There can be no question that the government has obtained the use of facilities and individuals through contracting that otherwise might not be available to it. Experience and knowledge of types not prevalent in government are constantly on tap. All functions performed in the "private" sector of the economy are available as and when needed. Faced with demands for services as never before, accompanied by the clamor to prevent "big government," legislators and administrators have developed a device that at the outset could be all things to all people, and may very well be the only possible manner of pleasing both those who want a small government and those who want big new governmental programs. The government, following Vannevar Bush's policy in the World War II Office of Scientific Research and Development, has used talent where it could be found with a minimum of disruption. The use of contracts allows short-term projects to be carried on without a regular staff with which the "government would be saddled." It allows full flexibility of personnel policies and salaries, fringe benefits, and working "atmosphere," which can be changed as the work changes. People with fresh ideas are free to be hired and released without a single civil service regulation being applied. Whole institutions and their prestige can be hired when needed, in effect temporarily "nationalizing" them. The glamor of the independent "unbiased" source can be acquired to sell ideas to an agency's staff, Congress, or the public (as in management analysis work). Special equipment for special projects need not be bought, only to lie unused at the end of the program. People who would not work for the government because of salary, red tape, pension and personal commitments, etc., are obtainable.[7]

Contracting out is thus a system that allows the government to farm out a complete range of administrative and executive responsibilities accompanied by money, authority, and responsibility. These advantages are real and immense and, given the demands for services and for the continuation of a "free enterprise" system, probably essential.

Problems of Cost and Control

Nevertheless, the government, and therefore those who demand the services, must pay a price for these advantages. The first problem is that the government will never be able to attain the knowledge and experience to perform its assigned functions with civil service

[6] U.S. House, 86 Cong. 1 sess., Committee on Appropriations, Hearings before the Subcommittee . . . on *Mutual Security Appropriations for 1960*, p. 1208. Figures on use of contract employees from ICA Statistics and Reports Branch, July 26, 1960.

[7] The following sources were useful in determining the advantages of the contracting system: Bureau of the Budget Circular A-49, *Use of Management and Operating Contracts* (Feb. 25, 1959); Lee A. DuBridge, "Science and Government," *Chemical and Engineering News*, Vol. 31 (Apr. 6, 1953), pp. 1384-90; U.S. House, 85 Cong. 2 sess., Committee on Post Office and Civil Service, Hearings before the Subcommittee on Manpower Utilization . . . on *Manpower Utilization in the Federal Government*, pp. 108, 136; U.S. House, 86 Cong. 1 sess., Committee on Appropriations, Hearings before the Subcommittee . . . on *National Aeronautics and Space Administration Appropriations for 1960*, pp. 171-72; *Senate Report 139*, 85 Cong. 1 sess., pp. 31-33.

and military personnel if it contracts for them every time they are needed. If an agency makes contracts in order to obtain any of the many advantages mentioned, it thereby prevents its own people from acquiring the knowledge useful or necessary for performing the same or similar work at another time. It is providing an opportunity (particularly in research and development work) for patentable inventions to be created, the ownership of which is a serious source of conflict and unpleasantness.

Secondly, the incentives to efficiency in most of these contracting operations are quite small, and in some cases negative. Since most research and development is done on a cost-plus-fixed-fee (CPFF) basis, a contractor who accepts such a contract "to get in on the ground floor" has little inducement to keep his costs at a minimum. The more he experiments, the more he learns, and with little or no out-of-pocket expenses. He, in essence, receives an education at government expense, and the government may well pay for more research on a particular project than it needs or wants. When it is also considered that the research and development contract is quite often the forerunner of the production contract, much of which is on a fixed-price incentive basis (i.e., the government and the company share in any "saving" below the "target price"), the research contractor has a positive incentive to boost his research and development costs as high as possible so that the production target price will similarly be set high. This presents a very difficult control problem.[8]

The price of economy may come as high as the proverbial price of freedom—eternal vigilance. The Atomic Energy Commission in its early years attempted to instill a nebulous patriotic and non-remunerative concept of satisfaction in its contractors to increase efficiency under CPFF contracts. This apparently failed badly, and the AEC was forced to assume greater supervisory responsibilities over its contractors. The Air Force, which has attempted to contract for the performance of functions in as bold and imaginative a fashion as did the AEC, may learn the same lesson.

The third problem is that the simple dependence of the government, particularly the military, on contractors may be most undesirable. The Department of Defense and the three military services already find themselves heavily dependent on their "think group" contractors, like RAND, and would be severely handicapped without them. The NASA has said that it would need five years to replace the facilities and manpower now possessed by its CPFF contractor, Jet Propulsion Laboratory of the California Institute of Technology, and the experience and know-how of this group could not be so easily replaced.[9] With such dependence, what happens if the contractor and the government disagree as to fee, patent rights, or any of the many other features of the contract? At least one congressional committee finds it "difficult to conclude otherwise" than that all impasses are resolved in favor of the contractor.

The dependence of the government on civilian contractors in time of war may prove embarrassing at best. Today civilian contractors are even operating at military bases overseas. Contractor personnel are needed to set up missile bases, to help train military personnel, and to analyze technical problems beyond the capabilities of the military. As time passes, perhaps, the military will gain experience and need less contract support on any particular missile system. Nevertheless, in view of the rapid rate of obsolescence of new systems, it has yet to be demonstrated on a sustained basis that the military can perform its required functions without large amounts of contract support. In time of war, what is to guarantee that such support will be available when needed?

A fourth problem connected with contracting for services is that of salaries. As function after function is contracted, the bidding price of good personnel goes up and the government finds itself unable to hire and keep good men at civil service salaries. Contract research

[8] *House Report 1959*, 86 Cong. 2 sess., pp. 33-35. This observation was made by the House Armed Forces Committee Special Subcommittee on Procurement Practices of the Department of Defense. The fact that the Air Force has consistently underestimated the cost of CPFF research and development contracts by an average of 18 per cent and the Navy has underestimated such costs "significantly" suggests that the problems of cost control have not been solved. *Ibid.*, p. 35.

[9] U.S. House, 86 Cong. 1 sess., Committee on Appropriations, Hearings before the Subcommittee . . . on *National Aeronautics and Space Administration Appropriations for 1960*, p. 99.

and development centers have taken from the federal government approximately 12,000 employees per year in recent years, seriously reducing the government's "in-house" capabilities. The NACA-NASA has suffered acute losses of top personnel since January 1955. More than 250 GS 11-16 personnel were lost to industry, seventy-three to just three companies. They had a median service of eleven years with government. Such losses are certainly felt in the ability of the government to provide services for itself.[10]

It is frequently suggested that the practice of contracting for services is in large part forced on the government because of the need to pay higher salaries than Congress will permit. The Institute for Defense Analysis, the Defense Department's "think group," was largely created for just this reason. The salary problem is most severe for personnel with many years of experience, particularly if they have executive and managerial ability. The median salary increases for the top NASA officials who went to private industry was one to three thousand dollars. The exceptional younger man is also a difficult person for the government to get and hold. Direct government employment becomes increasingly unattractive as contractors' salaries become distinctively better than government salaries.

One of the ironic features of the present situation is that the government is indirectly paying these people what it will not pay them directly. At the same time, it is creating centers of competition which raise the price for good people higher than would be the case with direct hire. It cannot be overlooked that the government, directly and indirectly, is the primary market for most of them. A more orderly procedure might, perhaps, allow sufficient savings to train enough new personnel to supply the entire market. The pirating taking place by contractors against the government, and among themselves, may well be an important disrupting factor in the very functions which the government desires to see performed quickly and effectively. It certainly would seem to be an inflationary factor. Individual government agencies seem to feel that the advantages of uncoordinated and extensive contracting are worth this price, but from an over-all viewpoint, are the advantages such as to be worth the risk of destruction of the civil service system?

[10] U.S. House, 86 Cong. 2 sess., Committee on Post Office and Civil Service, Hearings before the Subcommittee on Manpower Utilization . . . on *Manpower Utilization in the Federal Government*, pp. 13-14, 24ff.

Problems of Policy

From a policy point of view, the effects of contracting for services may be equally disagreeable. The Attorney General has pointed out that:

> This Government must be deeply concerned with the future of competitive enterprise, and it is important that its share of this activity [research and development] be administered to promote competition within the limits possible under the urgency and complexity of the defense program. . . . [W]hat indications are available warn that the Government expenditures may not run counter to the industry trend toward concentration, but in some degree may reinforce it.[11]

Since the advanced stages of the research and development phase blend into the early stages of the production phase, most private firms have viewed research and development contracts as the admission price for the subsequent "follow-on" production contracts. These companies frequently complain that the profits from research and development contracts are too small, since many customary business expenses are nonreimbursable.[12] To the extent that this is so, the government can only contract with those companies that can afford to delay their profit-making and engage in weapons production, and this usually means larger businesses.[13]

When the government gives contracts to a corporation in amounts exceeding $1.9 billion a year, it is creating a great center of power over which it has only limited control. Subcontracting takes place under practically all of the large contracts, and in most cases the "prime" contractor has considerable latitude as to where and with whom he will sub-

[11] Cf. *Report of the Attorney General* (Nov. 9, 1956), pt. 1, "Government Sponsored Industry Research." This part of the report is reprinted in full in U.S. House, 86 Cong. 1 sess., Committee on Science and Astronautics, Hearings before the Subcommittee on Patents and Scientific Inventions . . . on *Property Rights in Inventions Made Under Federal Space Research Contracts*, p. 896.

[12] *Aviation Week* (Mar. 9, 1959), p. 217.

[13] *Report of the Attorney General* (Nov. 9, 1956), *op. cit.*, pp. 888-904.

contract. The laws requiring special consideration for small business and depressed areas in government contracting do not apply to subcontracting by prime contractors unless the agencies make them apply. In many cases small business has felt that the agencies have taken a dim view of any such requirement.

Along the same lines, the prime contractor has considerable latitude as to whether he will make or buy subsystems and, if left alone, will frequently "make" whatever he can—whether or not he has the capability at the start of the contract—so long as the contracting agency does not object and he can meet his deadlines. How desirable is it to place the well-being of small-business sheep in the paws of the big-business lion?

Still another policy problem is the changing relations between government and industry. Many small businesses today are totally dependent on government contracts. RAND, ORO, STL, etc., are for all intents and purposes government organizations, except that they are not government owned, their personnel are not civil service and are not subject to the Hatch Acts, and they are not protected against a sudden decision by the government to end the contract. One author, in attempting to characterize the changing government-industry relationship, called it a "new federalism,"[14] another called it a "partnership," while a Congressman who would not have much use for high-sounding phrases simply said it is not free enterprise. Perhaps it is a "missing link" between socialism and private capitalism. From a policy standpoint, is it desirable?

A further point of concern from the viewpoint of public policy is the effect government contracting is having on the nation's educational institutions. Colleges and universities and their associated research centers are receiving approximately $760 million per year for the conduct of government research and development work alone.[15] They are operating and managing a number of government facilities and are constantly loaning personnel for high-policy consultations. The military services each have contracts with well over one hundred institutions of higher learning for basic research alone. Such a widespread use of educational institutions as contractors cannot help but bring about fundamental changes in the American educational system, and these must be examined from a policy standpoint.

Conclusion

The critical tone of many of the preceding comments should not be taken as disparagement or condemnation of the system of contracting for services. In an age of international and intranational interdependence, many of the problems mentioned are unavoidable. Professor Marver Bernstein has noted in another connection that the government-non-government dichotomy has "ceased to exist," and also that "many government employees are so closely connected in their official duties with the work of private firms that they are in part industry personnel."[16] As we have noted, the same thing has happened in reverse to employees of private firms. The risks of conflicts of interest are immense, but no very desirable alternative presents itself.

No simple formula can be given as to when the government should contract for services, or whether it should at all. Perhaps contracting is the answer to the modern counterpart of the problems for which the government corporation was created in an earlier day. However, the effectiveness and efficiency of this system which, like Topsy, "just grow'd," need to be questioned and examined until we learn at least as much about it as we know about the problems of administering the regular government agencies.

[14] Don K. Price, *Government and Science* (New York: New York University Press, 1954), p. 46.

[15] National Science Foundation, *Federal Funds for Science, VIII, op. cit.*, p. 50.

[16] Marver H. Bernstein, "Conflicts of Interest in Federal Employment," a paper prepared for delivery at the Annual Meeting of the American Political Science Association, 1959, p. 13.

Global Productivity Measurement: An Aid to Administrators

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➤ The author, an economist and management consultant, suggests global productivity analysis as an additional means for examining and controlling organization operations in federal, state, and local government, where global productivity refers to the calculation of output per unit of input for the whole of the organization.

He reports the findings on global productivity in government to date and illustrates his argument with a "do-it-yourself" case.

Introduction

GOVERNMENT is a constantly expanding factor in the economic life of modern industrial societies, with one out of every five and one-half to six employed persons being in federal, state, and local government work in the United States today as against one out of every twenty-four in 1900, and with 30 per cent of U.S. national output going to the cost of government.[1] While government growth is recognized by most authorities as basically a function of industrialization and urbanization, there has persisted a legend that government work is not carried out efficiently or productively—that is, in a "business-like" way. It has now been demonstrated empirically, for postal and general government activities, that the concept of global productivity can be applied to government work and will show that the trend of such federal government productivity in the United States has been fairly similar to that of the private economy, probably for many years.[2]

This is another way of saying that the output of goods and services per man-hour[3] is increasing at about the same rate in government as in "industry," provided that we include in the comparison *all* the man-hours expended in government as well as *all* the man-hours expended in industry. This proviso, which is important, permits the measure-

* The writer acknowledges the helpful advice and criticism of John W. Kendrick, Professor of Economics at George Washington University, and Irving H. Siegel, Operations Research Office, Johns Hopkins University; also of Thomas Enders, John P. Richey, Chester Myslicki, David B. H. Martin, Emmanuel R. Alexander, John L. Horgan Jr., Harvey D. Lewis, and Harry W. Kaiser.

[1] Measured by the federal "cash budget" plus the state and local budgets and including gross postal costs in the federal "cash budget."

[2] The original Post Office Department calculations were by Witt Bowden, "Technological Changes and Employment in the United States Postal Service," *Bulletin No. 574*, Bureau of Labor Statistics (U.S. Government Printing Office, 1932), for the period 1908-1931. They were extended to 1940 in Solomon Fabricant, *The Trend of Government Activity in the United States Since 1900* (Princeton University Press, 1952); and are to be extended to cover 1879, 1889, 1899, and 1909-1953, by John W. Kendrick (*Productivity Trends in the United States*, Princeton University Press, scheduled for June 1961 publication).

For Post Office Department and general government calculations, 1947-1958, see: Henry D. Lytton, *Estimating Recent Federal Agency Productivity Trends* (privately-printed, Washington, 1959); "Recent Productivity Trends in the Federal Government: An Exploratory Study," 41 *Review of Economics & Statistics* (November 1959) 341-59; "Government Efficiency and Its Measurement: A Problem for the Economist, the Management Man, and the Public," *Congressional Record*, March 31, 1960, A2892-4; "Measuring Output in the Public Administration Field," 21 *Productivity Measurement Review* (Paris, May 1960) 59-73.

[3] Output per *unit of input* is the general definition of productivity used in this paper. "Global" productivity refers to the productivity of the whole of an organization. Over short periods of time, whether it is calculated per hour or by the year (per man), there is normally very little difference in annual comparisons.

ment to be called "global." The basis is distinctly different from that usually stipulated in public administration. In public administration we have been most familiar with measures of the work performance of individual workers, whether or not the measures were calculated by individuals or groups.

These empirical global productivity studies, which have been proceeding for thirty years, used economists' methods to calculate both industry and government output and man-hours. It is safe to say, however, that the economist-minded authors of the government productivity studies were not interested merely in commenting on existing Parkinsonian-type criticism of "big government"—valid as such criticisms often may be. Careful reading of their reports, as well as of other serious literature directed at this question by economists, industrial engineers, behavioral scientists, statisticians, and others, will reveal a common awareness of the *relevancy of global productivity findings to questions about individual or average worker efficiency or performance.*[4]

This paper will attempt to: 1) explain the essential differences and similarities in the two approaches and how they are related, 2) show how the global productivity approach operates, 3) indicate what the findings to date suggest about normal global productivity trends, 4) outline global productivity measurement's potential usefulness in administering government programs, and 5) present a "do-it-yourself" application of global productivity measurement on a "bureau"-wide basis.

What Individual Performance Measurement Leaves to be Desired

The essential problem faced in government operations evaluation arises from the existence of a false hope and a fictitious theory.

The false hope—persistent at plant level in industry since 1760—has been that individual performance measurements can be taken of *all* activity and somehow aggregated by whole economic entities—firms in industry first, agencies in government later—and then whole economic sectors.

The fictitious theory arises spontaneously in the process of our trying to apply business principles en bloc to public administration operations. It is that we can maximize economy in government by using performance budgets and manpower and/or dollar-expenditure limitations. Something like this is done in industry in conjunction with profit and loss statements. Trying to do it in government without the equivalent of such statements—comprehensive productivity or efficiency evaluations on an agency-wide basis—is like riding horseback blindfolded, while trusting solely to empire-expansion restrictions is like locking the stable after the horse has been stolen.

Individual performance measurement systems have their place, but only when such systems become "global" do they become additive in the sense that the total of all such measures of a characteristic comes to represent the average characteristic of the whole. That can happen only when the attempt to measure individual performance alone is abandoned, the coverage of persons included becomes global, and a ratio or index of work done globally per average person employed globally is used. That is global—or organizational—productivity measurement![5]

Public administration can make up for the absence of the profit motive in government only by using a system which allows the public's business to be conducted in a goldfish

[4] See economists Colin Clark, Frederick C. Mills, Laszlo Rostas, and Irving H. Siegel; Richard Ruggles and Sanford S. Parker, economists who specifically discuss government productivity at some length; engineers Abruzzi, Hopf, Melman, and Hiram S. Davis (who specifically discusses government productivity); the behavioral scientist Mayo; the management theoretician Thorelli, and practicing government statisticians Mandel, Rosander, and Schachter.

[5] Systems of group performance measurement which are global in the above sense and which are keyed to current national average performance (rather than to "standards" of any kind) exist in the Social Security Administration's Bureau of Old-Age and Survivors' Insurance, the Commodity Stabilization Service, and certain components of the Navy Department's shore-based civilian establishment; and formerly existed in the Internal Revenue Service's Collection Division. Primarily designed for inter-office comparison, progress reporting, and/or budget projection purposes, they actually are adaptable to and compatible with global productivity measurement at the bureau and agency level. The first two systems furnished results used in the present study. The Navy data, which reflect the activities of about 200,000 out of 500,000 maintenance and operations personnel, were described by Nathan M. Schachter, Navy Management Office, in an address to the Washington, D. C., Inter-Agency Management Analysis Conference, May 1, 1961.

bowl. Once the end product or intermediate product or by-product used in each of the countless item work counts composing the typical individual performance measurement system is allowed to pass unchallenged, the public's economy battle is lost. There are scores, even hundreds and thousands, of such items in individual systems. There is no possible hope of public accountability showing why they are considered necessary parts of the public's business or how effectively they are carried on by government.

On the other hand, identities of the relatively small number of products used in productivity measurement, especially if intermediate products are omitted, can be publicly ascertained. They (along with their work counts) are usually already published in full as public information material, budget justification items, or testimony given at annual legislative hearings. Given this publication of work data, the undeniable existence of manpower and even man-hour data potentially allows public verification of work done and men employed, which is at the basis of global productivity measurement. The resulting agency global productivity trend, which can be compared with similar work elsewhere and with earlier periods, serves in the place of a profit-trend calculation.

Global Productivity Analysis

To understand the concept of the "global productivity" of an organization clearly, it is necessary to repeat that *all* the man-hours expended in that organization are to be considered. It need only be added that *all* the work of the organization also has somehow to be fairly represented or approximated in a straightforward and comprehensible way.

This is easy when there is only one product involved, such as steel produced by an industry or letter mail delivered by a post office. The annual output might be expressed in these cases as 90 million tons of steel or 30 billion pieces of mail. The intermediate accomplishment of equivalent quantities of steel melted or mail collected can and should be ignored.

Without considering differences in personnel, which could be reflected in average salary levels for weighting purposes, the productivity of the two organizations might turn out to be something like 100 tons of steel or 50,000 pieces of mail per man per year. Then, if these figures rose to 102 tons and 51,000 pieces the second year, the productivity increases would be the same in each case—2 per cent. Putting both calculations on an index basis, which would place each at 100 the first year and 102 the second, would facilitate comparisons.

Output Problems

The more difficult cases arise when output is multi-program. With no common denominator to use, for example between loans and insurance policies processed by a veterans administration, what shall be used? Here the index number device is crucially important. Suppose there were, at the start of the period, twice as many persons working on policies as on loans; those manpower proportions could be used to "weight" the combined output. For instance, if only the insurance policies output rose, by 3 per cent, from the first year to the second, then the weightings would be: policies —103 per cent x 2—206 per cent; loans—100 per cent x 1—100 per cent. Then, with the sum of the weightings 306 per cent and the sum of the weights 3, the combined weighted output would be 306 per cent divided by 3, or 102 per cent, in the second year.

An additional complication would already have arisen if, within any program, output was multi-product, e.g., there were different kinds of loans or different kinds of policies, requiring distinctively different amounts of work to process in each case. This would merely have required weighting the different products within the programs, *before* the programs themselves were weighted, to give in their turn an agency weighted output index, and so on for a government-wide weighted output index.

Further, potential man-hour-requirement or cost weights may change gradually from year to year, but such changes are really part of the changing productivity situation and should not be recognized in weighting output items. The same fixed weights—those of a base year or base period, for example—should be used throughout an analysis. The U.S. Post Office Department, for example, provides annual costs "ascertained" by end products. Those for 1947 were adjusted to exclude purchased transportation costs and divided by

1947 end-product volume counts to get 1947 weights for use in this paper.

Input Problems

The same progression from simple to complex cases occurs on the input, or denominator, side of the productivity (output/input) ratio. For the simplest case, there is only one input—manpower. The simplest form of manpower is average personnel.

Conversion into man-hours worked makes considerable difference when looking backward to the days of the 44-hour, 48-hour, and longer work weeks, but for current years may not be too significant. On the other hand, allowance for different pay levels might make more difference when there are high-paid and low-paid organizations to compare.

Much more serious can be the necessity of adjusting global productivity, or individual performance, trends to allow for the fact that machines, especially electronic data processing machines, can also become dynamic major factors of production. Too, there is the factor of goods and services purchased to be considered as an input, but this normally doesn't bulk too large in civilian government agencies.

To solve the presently emerging problems of automation—especially in government where no price tags are placed on output—annual data on direct and overhead costs of data processing machines and equipment will probably be collected soon. This would make possible the immediate inclusion of weighted manpower and weighted automation inputs in the productivity ratio and tell us the answers to many pressing questions.

Defining the Global Unit

When a unit (bureau or the equivalent) administers several programs and an agency in turn operates several units, what are the proper outputs and inputs at each stage? The solution to this question merely requires reshifting of the base whenever the frame of reference is shifted. Standard index number construction procedures taught in statistics courses need only be slightly extended to get the know-how for this and for weighting products, program outputs, and inputs.

At the unit level, the various program outputs are aggregated into a unit output, the weighting being by *program* personnel, while input is simply the total personnel of the *unit*, including all "overhead" personnel not assigned to any output-producing organizational component. The entire process is repeated at the agency and government-wide levels, where there are always more layers of "overhead" personnel by the same definition.

Major Problems

The most laborious and time-consuming task is that of reconstructing personnel distributions in former years to conform to current organizational patterns. The structures of input and output must correspond and the most faithfully maintained historical series of data are those on output—one important reason for not changing basic organization structure without good purpose.

The most extensive computational problems are those of weighting and aggregating in order to get the most impartial representative results to portray the global productivity at each level without any biased adjustment or correction by a subordinate or administrator.

The principal conceptual problems in practice are those of identifying and selecting the products to be used.[6] The goal should be to strike a mean between too many end products to be intelligibly embraced and easily manipulated, and so few, less than perhaps a half dozen per unit, that important changes in the "product-mix" may not be reflected. Like any tool, this tool must be used correctly for the right job.

Answering a Few Objections

It may be justly argued that you can't measure everything, you can't measure quality and complexity, and that measurement will de-emphasize quality. Aside from the fact that these same objections apply with even greater force to the existing non-global systems of individual performance measurement, it appears 1) that the global method captures enough output to be worthwhile, 2) that it captures more quality and complexity than individual performance measurement since direct-labor employee groups are safeguarded through global inclusions of quality- and complexity-induced increases in "overhead"

[6] On this problem see: Henry D. Lytton, "Measuring Output in the Public Administration Field," *op. cit.*

and indirect-labor staff, and 3) that this very safeguarding of quality's influence prevents its de-emphasis.

Findings—Actual and Prospective

The nature of findings about global productivity trends in government, education, and health to date gives very good grounds for expecting that similar measurements will be extended to cover most or all of these areas and for speculating about how their normal global-productivity growth rates will shape up. The long-term productivity trends of both education and health, taking quality of service into account, have been reported as probably negligible.[7]

Global Productivity Growth Rate Differentials in Government

The general government activity for which global productivity rates of growth have been available for the longest time is the U. S. Post Office Department. The 81-year record on this, for the years 1879-1960, now shows a long-term average annual gain of about 1¾ per cent. This is about 75 per cent as good as industry's comparable rate, possibly because of the greater requirement to give fully-staffed public service at all times.

The findings show a drop to an average annual gain of about 1¼ per cent in the 1947-1958 period, with no perceptible productivity increase at all in 1957-1960. This may reflect the overloading of facilities in the communications field which has brought once-a-day mail delivery and which may see automated post offices coming to the rescue in future years. It also reflects the greater number of suburban mail boxes serviced per mail carrier recently.

Table 1, which is arranged in descending-size order of organizations, shows this eleven-year average annual increase rate for the Post Office Department to be surpassed by the contemporary growth rates of five smaller general government organizations—all of which are at the unit level. This may be due in part 1) to restrictions upon the sample owing to the absence of any other available data, 2) to the fact that all organizations presumably have their own individual growth cycles which are not necessarily synchronized, 3) to innate differences in the kinds of service expected and performed by each, 4) to different conditions brought about by management, labor, and capital, etc. in each, and 5) to the possible effects of non-standardized reporting systems. At the low end of the size spectrum, for instance, the Veterans Administration insurance productivity ratio obviously profited by mechanization and the re-concentration of field station locations during this period.

Table 1

Average Annual Increases in Productivity (Output per Person) in Six Federal Civilian Agencies for the Period, FY 1947-1958

Agencies	*Average Annual Productivity Increase in %*
Post Office Department[a]	1.26
Internal Revenue Service	3.4
Social Security Administration[b]	4.8
Veterans Administration, Department of Veterans Benefits: Pensions, Training, Guardianship, and Loans	3.9
Commodity Stabilization Service[c]	8.2
Veterans Administration, Department of Insurance[d]	11.1
All Organizations Weighted Average	1.85

[a] 1947 weights used
[b] Last eight years data only
[c] Last seven years data only
[d] Data revised and weighted

Of all the growth rates in the table, the weighted average for the six general government organizations is of course the most important. All would be higher if the relatively severe influence of the recession year 1958 were removed, with the average then rising to about 2.2 per cent.

Global Productivity Trend Fluctuations Between Different Years

The year-to-year changes in the indices of output, personnel, and productivity for each of the six organizations in Table 1, as well as for Veterans Administration's Department of Medicine & Surgery and for all seven organizations combined, are available in earlier reports. Although the eleven-year trends have since been placed on a fully weighted basis or otherwise improved upon, the year-to-year changes have not been recomputed in all instances.[8]

[7] *Idem.*

[8] *Idem.* The original VA Dept. of Medicine & Surgery series has been replaced with a weighted series, incorporating a tentative quality-of-service indicator, which covers the last seven calendar years and shows an average annual productivity increase rate of 0.4%.

Nevertheless, it will be worth while looking at the original yearly average record of the seven organizations, as shown in Table 2, together with preliminary 1959 results. In doing so, one should merely keep in mind that the output and productivity figures for all but the latest year in the table should be revised upward generally about one-fifth.

Table 2

Annual Average Changes in Output, Average Employment, and Productivity for Seven Federal Civilian Agencies for the Period, FY 1947—FY 1959*

Annual Average Change in Percent

Year	Output	Average Employment	Productivity
1948	5.8	1.6	4.2
1949	3.5	3.2	0.4
1950	0.5	—0.5	0.9
1951	2.2	—1.3	3.6
1952	3.1	1.0	2.1
1953	0.2	1.7	—1.5
1954	1.5	—0.6	2.1
1955	3.4	0.4	2.9
1956	2.1	0.8	1.3
1957	4.0	2.0	1.9
1958	—0.3	1.3	—1.6
1959*	0.9	0.7	0.2

* The seven agencies include the six agencies in Table 1 and the Veterans Administration's Department of Medicine & Surgery; Veterans Administration's Department of Veterans Benefits was not included in the 1959 preliminary figures.
* Preliminary

As Table 2 shows, output increased noticeably every year but 1950, 1953, and 1958. Personnel decreased only in 1950-51 and 1954. Productivity increased noticeably except in 1949, 1953, 1958, and 1959. To attempt to show how these departures from trend may begin to mirror both events internal to government and general outside business conditions, when they are based on such a sample of government-wide operations as this, the following speculations may be advanced:

Output. The record output increase in 1948 may reflect a postwar rationalization of production, and the 1950 and 1953 minor increases, as well as the 1958 decrease, may be owing to recessions in general business activity.

Personnel. The 1950-1951 and 1954 personnel declines may reflect economy in government drives and that of 1951 also some loss of manpower to defense agencies and armed forces.

Productivity. The poor 1949 productivity increase could represent a reaction after the previous year's upsurge (but also draws attention to the hardly expected staffing-up which occurred coincidentally); and the poor 1953 and 1958-1959 records may reflect, respectively, some return of manpower from defense agencies and armed forces, and a combination of a) conscious budget unbalancing to counter the recession, b) some staffing-up to do research and training in automation, and c) looser budgeting than intended (with some failure to project manpower needs on any year-to-year productivity increase basis).

Expectations for the Future

Developments already under way in public administration and related fields should be considered as well as the actual findings. Continued improvements in fiscal management such as annual inventories of all assets, cost-based budgets, profit and loss statements, and long-range program budgets have been mapped out. All these—particularly the program budget—should help make global productivity analysis easier.

Again, there is an ever-growing interest in international inter-firm comparisons of global productivity outside the borders of the United States. At least sixty-three countries and four continental organizations—many with faster growth rates than our own—now have national and international productivity centers designed to help individual firms and industries along these lines. In his private capacity as an economist, John W. Kendrick, then chairman of the U.S. Bureau of the Budget's Inter-Agency Committee on Production and Productivity Estimates, recommended such a national productivity council for the United States almost two years ago. Senator Javits has twice introduced bills to create such a council.

To economic research bodies, the relative dearth of information about productivity trends in industries outside the commodity-producing sectors (the service industries, construction, trade, and government) of the economy has long been apparent. Many moves have been started to plug some of these gaps.

In Congress, the Joint Economic Committee has had a continuing interest in productivity trends and their measurement. In 1958 and 1959-60, it canvassed several economists' thoughts on government sector productivity and reflected interest in the possibility of soon

getting data on federal government global productivity trends. In the last and present Congress, the Davis Manpower Utilization Subcommittee of the House Post Office & Civil Service Committee has "recognized" increased "employee productivity" in government and promised to follow the matter further in individual agency hearings.

All this indicates that the measurement of global productivity in government agencies can be expected to grow in the years immediately ahead.

Implications for Public Administration and Public Administrators

The legendary concept of government as "unproductive" dies hard. Every administrator—bureau and division chiefs as well as agency or department heads—should want to know what the innate trend of global productivity in his own bailiwick *is* and what it *ought to be*. Similarly, he should want to know what the correspondence is between such measures, on the one hand, and over-all measures derived from any existing engineered standards, work measurement, work sampling, statistical quality control, and other individual performance measurement or operational reporting systems, *upon their conversion to the nearest equivalent of a global basis*, on the other hand. If they are not convertible, they may still have a relevancy, but it will have to be defined.

An unbiased analysis could show the administrator his organization's approximate global productivity trends. Projected public and private sector normal growth rates, supplemented by direct inter-agency comparisons as the latter become available, could give him what they *should be*. Individual performance measurement or operational reporting system operators should be asked to adjust and extend their actual results and "pars-for-the-course" and relate them to global productivity results—or else disprove the relevancy between the two approaches. In this way, the best of these "systems" could survive as multiple parts of a tool kit for objective agency evaluation.

It was mentioned above that variables can be removed from global productivity results. Over time periods, economic and statistical analysis of data, with managerial cooperation, can point to the presence of external and internal variables and the possible magnitude of their effects, as in the interpretations of Table 2. Over geographical jurisdictions, similar cooperation can make similar allowances for such variables' differing importance at different locations.

Moreover, when there is a large number of such locations—as in the case of a field organization with several score field branches—any systematic effect of all-pervasive influences such as size of branch and branch's assignment to *mandatory extra overhead* duties can be statistically allowed for. In the case of one such large field organization, about five-sixths of the "productivity" differences were removed by multiple correlation, relative standings of branch managerial ability were radically upset, and the true nature of branch managerial ability (manager and work force combined) fully revealed for the first time. The same process could be applied to branches by programs and their subdivisions.

Repeating the measurements quarterly (or even monthly) on a twelve-months running data basis would avoid seasonal variation complications. This short-term application completes the gamut of the uses of an evaluative system.

Global productivity measurement could, therefore, be applied to and under any and all conceivable operating conditions. (Combat-troop, diplomatic, law-court, legislative, research, fire, and police activities are excepted.) Computer machines could be employed under appropriate conditions.

Such intra-organizational comparisons would of course be invaluable to both program and branch management, as well as bureau and agency management, pointing out areas where action must be taken to improve program, supporting, and staff operations, both nationally and locally. The same applies in inter-organizational comparisons, locally, nationally, and internationally.

Additional Advantages

In addition to the advantages in answering criticisms, evaluating operations, locating managerial and operational strong and weak spots, determining optimum size and overhead conditions, global productivity analysis offers many other advantages.

Global productivity analysis would introduce a unifying bird's-eye view of governmental operations. For the first time, perhaps, it would make government operations comprehensible to their administrators and outsiders. It would aid traveling inspectors, auitors, and supervisors of field units in the same way. The study of organization structures, management practices, and human relations problems would be assisted. Organizational goals could be communicated more succinctly to employees. Group behavior could be studied against the background of global productivity trends. Global productivity analysis would aid program planning and help make long-range planning more realistic. It would make the allocation of scarce resources to relatively limitless program needs more rational. It would facilitate more intelligent budgeting. And, finally, it would stimulate quantification consciousness of programs without sacrificing quality.

A Do-It-Yourself Case

The Department of Veterans Benefits of the Veterans Administration will be used to illustrate the computation of the global productivity measure. Its operations revolve around compensation and pension, education and training, home, farm, and business loan, and guardianship end-product programs. Here, only the full-period changes in global output, input, and productivity of the department from 1947 to 1958 will be discussed, and the interim year-to-year changes omitted. In addition, this illustration will follow a simpler approach than was originally employed.

Program Output

If, to illustrate program output calculation, we examine the Loan Guaranty program in the Department, we find that an estimated 387,218 fully automatic and 229,500 prior approval loans were closed in 1947. Then, if we apply available 1954-1955 unit man-hour requirement weights of 1.0 and 1.8, respectively, we find that $387{,}218 \times 1.0 = 387{,}218$ and $229{,}500 \times 1.8 = 413{,}100$. Summing these products we obtain, in round numbers, 800 thousand equivalent fully automatic loans for 1947. The same process for 1958 produces the figure of 282 thousand equivalent fully automatic loans (37,036 automatic and 136,274 prior approval). The program output index for 1958 is calculated by $282/800 \times 100 = 35.3$. The index for 1947 is 100. The output indices for the other Department programs are calculated in the same fashion.

Department Output

To obtain the Department output, the 1947 (base-year) personnel distribution for the programs of the Department was rearranged to conform to the current output and organizational structure and showed:

Loan Guaranty	2,701 (est.)	6¼%
Compensation and Pension		
Disability	14,249 (est.)	33 %
Death	1,406 (est.)	3¼%
Vocational Rehabilitation and Education	23,620	54½%
Guardianship	1,272	3 %
Total Department	43,248	100 %

Next the 1958 program output indices were weighted by their corresponding base-year program personnel proportions (shown above) as follows:

Program	*Output*	× *Weight*	= *Weighted Output*
Loan Guaranty	35.3	6¼%	2.2
Compensation and Pension			
Disability	53.7	33 %	17.7
Death	41.0	3¼%	1.3
Vocational Rehabilitation and Education	26.2	54½%	14.3
Guardianship	209.3	3 %	6.2
Department Total		100 %	41.7

Department Input and Productivity

The Department input index is calculated on the basis of total Department personnel, 18,608 in 1958 and 72,452 estimated for 1947. Thus, 18,608/72,452 gives us a Department input index of 25.68; and, corrected for the transfer-out of a supporting function in the interim, this becomes 27.45. Then, finally, the Department output index, 41.7, for 1958 is divided by the Department input index just calculated, 27.45, to obtain the Department global productivity index for 1958: $41.7/27.45 = 151.9$. A global productivity index of 151.9 indicates that department productivity increased 51.9 per cent in the eleven years. This 51.9 per cent increase was the basis for the average annual productivity increase rate of 3.9 per cent obtained from the compound

interest tables and shown in Table 1. We now have a figure that can be employed as a useful tool in ways described previously.

Supporting Services and Intermediate Products

It may seem that the supporting services of the Department have been omitted from the calculation of the global productivity index. However, in the aggregate, their manpower is included in global input. Moreover, although further back in the production line, their "intermediate products" have a definite effect on end-product program accomplishments.

Conclusion

Government productivity is no longer the "terra incognita" it was once thought to be. Global productivity analysis can add a formidable weapon to aid in the improvement of the administration of public business in the United States. By learning how to use this new tool administrators can help improve their own organization. By adding global productivity trend data from their organization to the growing pool of knowledge on this subject, administrators can perform a valuable service in the search for greater human control over our environment.

When Is Efficiency Made?

According to Tolstoy, Napoleon did not direct the course of the Battle of Borodino, 'for none of his orders was executed and during the battle he did not know what was going on before him.' Philosophizing about the battle in the Second Epilogue to *War and Peace,* Tolstoy remarked that: 'Every order executed is always one of an immense number unexecuted. Only the possible ones get linked up with a consecutive series of commands corresponding to a series of events, and are executed.'

Tolstoy wrote of battle at a time when communications and transport were so slow and uncertain that precise command and rapid maneuver of large armed forces were impossible. All the more interesting it is that his observations fit so nicely the German high command in the middle of May 1940, with all the liaison paraphernalia—radio communications, motorcycle couriers, Fieseler Storchs, and what-not else—then available. For all this bitter disputation among Hitler, Keitel, Jodl, Brauchitsch, Halder, and the army groups had little or no effect on the battlefield. The uncertainties and alternatives about which they wrangled did not much trouble Guderian, Reinhardt, or Rommel. While OKW [Oberkommando der Wehrmacht] and OKH [Oberkommando des Heeres] argued, the panzers rolled on west and reached the Channel almost before the high command knew what was happening.

—Telford Taylor, *The March of Conquest* (Simon and Schuster, 1958), pp. 231-32.

Resource Policies and Administration for the Future

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We are going through a number of significant changes that will affect our resources needs in the future. How can we make our resources policies more effective in the broad role they play in our national development? What must be done to improve the administration of our resources in the future?

It is argued here that a demand-supply analysis can furnish the basis for building a broad resources policy structure and that application of this analysis can offer some lessons for improving resources administration in the future.

THE adequacy of raw materials and natural resources for the future has been a matter of major concern to people throughout history. It is of concern to people everywhere at the present time, although the contrast between the optimistic outlook in the United States and a few other advanced countries and the difficult outlook in the less developed countries is sharp. The need exists in both types of places, however, for well-conceived resource policies and their efficient administration. A continuation of present affluence, let alone its increase, depends upon maintaining the flow of low cost raw materials and resource services of many kinds. Escape from the circle (where it exists) of low income, poverty, inefficient production, and low income again, requires major augmentation of the supply of cheap food, hydroelectric power, fuels, metals, and fresh water. National security is impossible without large capacity to produce or otherwise obtain those raw materials necessary to support major military strength, and this now includes virtually all raw materials.

Therefore, natural resources, both in the sense of products and in the sense of aspects of the environment such as amenities and economic location, remain important objects for national attention. This is true despite the declining role they play when their value is viewed as a per cent of the national product or when employment in their production is viewed as a per cent of total employment. In a real and inescapable sense the resource base supports the increasingly high and complicated structure of manufactures and services which characterizes the modern American technological economy.

NOTE: For statistical and other material this article draws from the comprehensive appraisal of the trends and outlook for natural resources in the United States now being prepared in Resources for the Future, Inc. under the provisional title *Resources for America's Future.*

Contradictory Resource Policies

In the past and down to the present time resource policies in this country have been contradictory and have been devised in response to numerous problems and objectives arising mainly in non-resource fields. For example, during most of our history public land policy has responded successively to the need for frontier defenses and public revenues, to the desire for continental aggrandizement and land ownership, and to the urgency of providing roads and railroads. Water policy has evolved in response to successive single purpose uses of water for navigation, irrigation farming, electric power, and flood control. Much of what passes for national minerals policy has come about as a means of encouraging and accommodating private enterprise in this field through such measures as tariff protection, rather easy terms for leasing mineral

rights on public lands, tax advantages, and government regulation in the interests of conservation and more orderly private business. Only here and there in an unsustained way have resource policies been conceived and administered with primary concern for resource development as a whole or for the broad role that resources play in national development. This is true despite several outstanding studies that have been commissioned at various times to address broad resource problems and recommend policies.[1] The difficulty has been not so much the absence of good studies and sets of recommendations as it has the failure for these to be translated into adequate legislative and executive action so that administration can proceed with the application of policies.

A basic reason for poor performance in this area of public concern is the failure to provide a framework within which resource problems can be visualized and policies shaped. There has not been an organized way of looking at the situation which permits a policy structure to be built. Without such a framework the nation is doomed to piecemeal attempts at national resource policy, characterized by inconsistencies which frustrate sensible and broad-gauged administration. For example, in the face of enormous surpluses of basic agricultural crops, how much and what kind of emphasis should be placed on soil conservation which ultimately will permit us to raise even more crops? How much quota protection and tax preference should be granted the domestic oil industry in view of the present glut of oil in the world? How much money and precious scientific talent should be spent in an effort to desalinize brackish and ocean water at lower and lower cost when most of the existing fresh water supply in the arid west is now used for low return purposes? How much should be spent for the development of outdoor recreation facilities through land acquisition, investment in camping and other facilities, protection of nature and wildlife, in view of competing demands for both funds and the land and water resources?

[1] See, for example, *Resources for Freedom*, the report of the President's Materials Policy Commission, 1952; the report of the President's Water Resources Policy Commission in three volumes, 1950; the reports of the two Hoover commissions that bear on natural resources; the report of the Mid-Century Conference on Resources for the Future, *The Nation Looks at Its Resources* (1953). Prior to these studies of the most recent decade were the numerous reports of the National Resources Planning Board in the late 1930's and early 1940's, as well as occasional earlier studies going back fifty and seventy-five years.

Demand-Supply Policy Framework

A serviceable framework within which resource trends can be seen and policies developed is the demand-supply framework. Such a framework consists of a display of the historical trends in demand for and supply of the variety of raw materials and natural resources which people want, along with a projection of these trends in an interrelated way for some years into the future—at least twenty years and perhaps even forty. Demand projections for the various intermediate products and basic resources can be made by extrapolating into the future past trends as they relate to the larger movements in the economy, such as production, income, investment, and the like. Allowances are made also for foreseeable demographic and technologic factors. The following table illustrates such a demand-supply framework by showing a few of the items. Medium estimates are shown, although there is actually a range of possibilities.

From this presentation of current and projected future demand one may turn to the consideration of supply potentialities and difficulties, item by item. One can look first at the domestic capacity for producing an item, and then in turn, examine possibilities for new discoveries, new technology, increased productivity, substitutions, larger imports, and so on. In the first instance, it may be assumed that costs and prices remain in their present relative position. If on this basis a supply problem is brought into view, either on the shortage or on the surplus side, one may then consider the various reaction paths which may ensue as costs and prices move upward or downward. For example, if there appears to be an impending shortage for a particular item, say lumber or fresh water, one may consider the chain of effects that might follow an increase in cost and price in terms of price elasticities of demand and supply, possibilities for substitution, incentive to exploration and adoption of new technology,

SELECTED ECONOMIC AND RESOURCE ESTIMATES FOR 1980 AND 2000[a]

	1960	*1980*	*2000*
Economic Aggregates			
Population (millions)	180	245	330
Labor force (millions)	73	102	140
Households (millions)	53	73	100
GNP (billions)	503	1,060	2,200
GNP per worker	7,000	10,000	15,000
Government expenditures ($ billion)	100	230	500
Private investment ($ billion)	73	160	340
Personal consumption expenditures ($ billion)	228	660	1,320
Intermediate Products			
Meat consumed (billion lbs.)	29	46	65
Cotton produced (billion lbs.)	7.5	10.4	16
Autos produced (millions)	7	13	27
New dwelling units (millions)	1.5	2.7	4.2
Steel produced (million tons)	99	175	340
Construction lumber produced (billion bd. ft.)	31	48	79
Fertilizer consumed (million tons)	25	41	67
Basic Resource Requirements[b]			
Cropland, including cropland pasture (million acres)	440	440	450
Forest land, commercial (million acres)	484	484	484
Grazing land (million acres)	700	700	700
Outdoor recreation land (million acres)	44	75	136
Urban land (million acres)	21	32	45
Timber (billion cu. ft.)	11	21	36
Water (billion gal./day)	250	340	480
Fuel (quadrillion BTU's)	45	83	136
Oil (billion bbls.)	3.2	5.4	9.6
Coal (million tons)	398	610	702
Iron ore (million long tons)	102	200	375
Aluminum (million tons)	2.1	9.6	20.0
Copper (million tons)	1.7	3.5	7.1

[a] Source: Taken from work in progress at Resources for the Future under the provisional title of "Resources in America's Future."
[b] From domestic and foreign sources.

possibilities for increasing imports, and so on. What are some of the general lines of policy and administrative action in the resource fields that seem to be indicated?

Croplands

Our medium projection of the amount of cropland which will be needed by 2000 shows only a slight increase over the 440 million acres needed now. (Actually an estimated 460 million acres were in use in 1960, resulting in some overproduction.) That is to say, continued increases in yields per acre will more or less counterbalance increases in demand arising chiefly from increased population but also to some degree from improved diet, higher consumption of meat, and other factors. Over the next ten or so years some reduction in acreage would be helpful, perhaps 5 or so per cent, until such time as the tendency toward overproduction can be brought in hand. Some good agricultural land favorably located with respect to markets undoubtedly will have to be shifted into urban and suburban uses as metropolitan areas extend outward into rural land. Perhaps some 160,000 acres a year on the average will be added to urban and suburban uses. Other farm land will go to highways and airfields. But still for at least the next few years overproduction of many crops will point to the need for farm land retirement.

Recreation Lands

Present trends indicate that much additional land will be required for outdoor recreation as the next few decades pass. With nearly 85 per cent larger population in 2000, with per capita income about twice as high, with a shorter work week and longer vacations, and with perhaps four times as many automobiles and very great increases in air travel, it seems perfectly clear that the demand for outdoor recreation forty years hence may increase by as much as five or ten times over what it is now. This will mean the acquisition and development of much more land for public recreation, as well as for private recreation, the intensification of use in present recreation areas, the need for much more careful location of recreation areas to encourage greater use, the development of water resources and wilderness for appropriate recreation purposes, and so on.

Lumber

Of all the truly basic raw materials, lumber seems to present the sharpest problem. This has been true for some years in the past as may be seen from the relatively large increases in price of lumber compared to other raw materials and in the fact that we produce domestically and consume no more now than we did forty or fifty years ago. This has stimulated some new technology in the use of low grade and scrap wood and has led to the substitution of plastics, paper, and metals for lumber in certain uses. For the future, however, it is clear that vigorous policies should be pursued to increase the yield of sawtimber

from our forest land. The greatest potential seems to lie on the smaller private holdings, predominantly in the south and northeast. This problem reduces itself largely to finding ways of encouraging better forest management on these holdings through extension services, tax alterations, better credit, appropriate insurance, and a host of other measures. A frontal attack on this problem might yield good returns, rather than looking upon it in a fractured way as a small part of several other types of policy having to do with agriculture, land tenure, soil conservation, credit generally, and forest policy oriented to national forests.

Water

In water the visible problems include insuring a more adequate supply in the more arid west and cleaner water in the more populated industrial areas where rainfall is relatively plentiful. In the arid portion of the country, in addition to the development of new supply through dam and reservoir construction and conserving water generally, there is an obvious need for redirecting the use of water, at least new supplies of water, from lower value to higher value uses; that is, toward domestic, industrial, and recreational use as this may prove possible through changes of public and private policy. In the more plentiful water supply regions, especially in the northeast, the midwest, and the southeast, the problem can be pinpointed as one of preventing and abating pollution so that supplies may be used and reused for a variety of purposes. Beyond this there is a critical need for maintaining at all times minimum flow in the streams as a means of diluting and carrying off wastes. A good beginning has been made in estimating demand for and supply of water by some twenty-two river basins in the country, having in mind costs of developing additional supply and minimum flow requirements.[2] Water problems have to be dealt with by major river basins. Thus, if the prospect in a region is for shortage or increasing cost of fresh water, and the magnitude of the shortage can be portrayed, it becomes possible for a set of policies to be established which is designed to provide direction and consistency to the variety of actions for overcoming the shortage or moderating its harmful effects. Actions in this case can be varied and may include more intensive research on desalinization, reservoir films to reduce losses from evaporation, means for long-distance transport of water, as well as construction of storage facilities. Some of these actions may be taken at the national level while others are more appropriate for states, localities, or even the individual users. They can be held together in a pattern more readily if all of them flow from a comprehensive view of the trends and probabilities and are thus directed more consistently toward solutions.[3]

Energy

In energy several objectives will continue to be important: low cost, convenience, certainty of supply. The prospect is that the American economy could obtain from domestic sources the energy supplies it will require for the next fifteen or so years at no general increase in cost.[4] Cheaper supplies of oil might be imported. For the last twenty or twenty-five years of the century one cannot now say that domestic supplies will be available in sufficient volume to prevent cost and price increases without resort to nuclear energy on a fairly large scale, at least for production of electric power and in high cost regions. But this, in turn, will depend upon further scientific and technological developments for reducing the cost of nuclear power. The energy economy is characterized by flexibilities and substitutions. This has been true in the past as we have shifted first from wood to coal and then to oil and natural gas. Maintaining flexibility should continue to be a principal object of policy. This implies an emphasis on research and pilot plant operations into new ways of handling conventional fuels, as well as the new sources such as nuclear fission, oil shale, tar sands, and others.

[2] See: Nathaniel Wollman, *Water Resources Activities in the United States: Water Supply and Demand*, U.S. Senate Select Committee on National Water Resources, Committee Print No. 32 (U.S. Government Printing Office, 1960).

[3] A principal recommendation of the Senate Select Committee on National Water Resources calls for "biennially an assessment of the water supply-demand outlook for each of the water resource regions of the United States . . .," Senate Report No. 29, 87 Cong., 1 sess. (1961) p. 19.

[4] Schurr, Netschert *et al.*, *Energy in the American Economy, 1850-1975* (Johns Hopkins Press for Resources for the Future, Inc., 1960).

The demand-supply way of portraying the situation and outlook can provide a framework within which problems of shortage or surplus, cost, substitutions, exports and imports, and the like can be seen to good advantage, and in terms of which alternative policies can be tested.

Metallic Minerals

For the metallic minerals many of the policy objectives cited for the energy commodities also hold. There may be greater advantages in importing many of the metallic minerals, and frequently there is somewhat less opportunity for substitution. Already we depend heavily on imports of copper, lead, zinc, nickel, manganese, bauxite, tungsten, and numerous others. The degree of dependence on foreign supplies has now become so great that military security requires stockpiles. This country now has some $8.5 billion invested in various non-agricultural stockpiles, principally metals, but it is a debatable question whether this is too much, just about right, or not enough. Much hinges on the kind of war that is hypothecated—its intensity, duration, the degree and kind of damage, and the recovery time. The outlook for as far into the future as one can see will be for large imports of metallic minerals, implying a need for lines of policy which can accommodate this.

Resource policies for minerals or for anything else are not sufficient unto themselves, but are part of yet broader national policies. For example, policies having to do with the disposal of surplus food crops in less developed countries, or with oil and metallic minerals imports, are strongly interrelated with foreign economic policy and foreign policy generally. Water development policy, insofar as it involves public works, has to be viewed as a part of public works and development policies generally, and as a part of employment policy since certain kinds of water projects may be speeded up to aid in counteracting economic recession. Energy policies are very closely related to national security policy in the broad sense; indeed, the major justification for tax depletion allowances in the oil and gas industries has to do with the need of special treatment to insure an adequate rate of exploration and discovery to meet conceivable defense situations.

Natural resource policies, like other policies, aim to provide a general guide to the flow of decisions on how to deal with foreseeable problems, in this case resource problems. If the problems cannot be seen with some clarity and quantitative perspective, the policies which aim to solve them have little chance of success. But the demand-supply framework, important and useful though it is, is not the only way of looking at resource problems policies. Many questions have to do with equities, returns, and special benefits among segments of the population and for various industries and regions. These are not seen in any full sense through a demand-supply window, even though the demand-supply framework can be exceedingly useful for such problems, and no resources policy should be established without some reference to the demand-supply outlook.

Lessons for Public Administration

In the final part of this paper I shall direct attention to more closely defined matters of public administration. What lessons for public administration may be drawn from this long-range, comprehensive, demand-supply way of looking at resource problems and policies?

Policy and Action

Administrative decisions and actions, in resource as well as other fields, are best when they flow from clearly enunciated general policies. The long-range comprehensive demand-supply way of looking at resource problems can aid greatly in furnishing broad and consistent policies. Administrators should be concerned not only with policies themselves but also with the factual and analytical basis for them. This is obviously a necessity for administrators at the upper levels; it is of almost as much importance for administrators at lower levels in understanding their own jobs and as training for advancement to higher positions. That is, an administrative decision down the line relating to a land or mineral lease or to a contract for purchase of timber stumpage should reflect a high fidelity to broad policies relating not only to leases and government contracts, but also to land or forest policy in the broadest sense. Furthermore, an administrator down the line should understand the close connections between ad-

ministrative policies strictly speaking and substantive policies, and the need for flexibility in applying the former to serve the purposes of the latter. Frequently this kind of flexible administration is to be sought in the timing of an action, for example the letting of a government contract, the placing of a purchase order, or even the scheduling of a crucial meeting.

Administrative Flexibility

Diversity of local conditions, both bureaucratic and geographic, points to the desirability of wide latitude and discretion in administration at the several administrative levels. For example, any program to improve management of small private forest holdings should be adapted to local forest conditions, local management practices, alternative land uses in the area, various educational and skill levels, local credit institutions, and to the ways in which government administration has been successfully carried out locally. That is to say, policy built for the long range should be flexible, and policy flexibility will be thwarted unless administration can also be flexible to an appropriate degree all down the line.[5]

Administering Long-Range Programs

Administrators will have to be prepared to cope with administering longer-range programs than they have had to administer heretofore. They will also have to deal increasingly with interrelated and multiple-purpose resource programs. Neither of these features is new; for example, administrators of the Tennessee Valley Authority have long regarded resources as both long-range and multiple-purpose in character. In the future nearly all resource administration will take on these characteristics. Furthermore, the span of interrelated purposes is being widened even beyond the resource fields proper into foreign policy, research and educational matters, full employment and production, and so on. All of this implies the need for broader training for resource administrators, both in the schools and through job experiences.

[5] Insights into forest administration may be found throughout Herbert Kaufman's *The Forest Ranger: A Study in Administrative Behavior* (The Johns Hopkins Press for Resources for the Future, Inc., 1960).

Administration and Research

Administrators in coming years will have to handle much larger research programs since the long view ahead of resource problems points clearly to the necessity for new discoveries, new techniques of extraction and handling, development of cheaper and more plentiful substitutes, and so on. A rich flow of innovations can only be sustained by generous support of basic research and education for such research. It may be anticipated that in the future all resource agencies throughout federal, state, and local government will be more concerned with research than they have been in the past; indeed this item in resource budgets may well prove to be the most rapidly growing item. Research personnel in some respects are a special breed requiring special attention. Their job is to come up with new ideas, think them through, and perhaps test them out; administration in all its aspects must be adapted to this primary objective. Beyond this, administrators will have to know more about the world of universities and private research institutes since much research in the public interest will continue to be done in them, either on their own or with the aid of government funds.

Education and Training

In order to bring along the trained professional specialists that will be necessary if we are to have the flow of raw materials our future needs indicate will be required, government agencies will find themselves increasingly involved in the education and re-education of their employees. Expansion of the federal executives' training program, by means of which government employees go back to school as it were, can be expected. If there is no school to which they can go and receive the kind of training they need, it will be imperative that government agencies aid in the establishing of such programs. The federal government has long been involved in agricultural education, not only in its practical aspects but in basic research and theory. In the future the federal government may also have to provide help in the establishment or expansion of education and research programs in other resource fields such as hydrology, plant and forest genetics, mineral economics, multiple-purpose resource ad-

ministration, among others. Special attention should be given in the universities to natural resources as a field of study to be approached through various science and social science disciplines. Any re-evaluation of the land grant colleges might consider these possibilities.

Policy Conflicts

Administrators will have to foresee policy conflicts before they become acute and be prepared to point out the administrative pros and cons of the alternative solutions, to undertake the administration of whichever solution is decided upon, and to audit the ensuing administrative experience. Policy conflicts may be foreseen in many resource fields: the shift from rural to urban land use on the outskirts of metropolitan areas, increasing production on small forest holdings, acquisition of recreation land, water allocation especially in the west, water and air pollution control in metropolitan areas, import regulations for oil and certain metallic minerals, stimulation of domestic mineral exploration through special tax and other incentives. One of the best ways to get a glimpse of possible future conflicts is through a careful examination of the trends of demand and supply as outlined earlier. This kind of format of the future also gives clues as to which present conflicts may dissolve more or less without any effort from policy and program and which ones will have to be dealt with forthrightly.

Structure for Policy Making

As a final point it may be noted that responsibility for providing the framework of demand-supply estimates will have to be pinned down. It could be done in the Department of the Interior or the Department of Agriculture where much long-range projection work is already done for agricultural crops, although the job is essentially broader than the scope of any one department. Or it could be assigned to an interdepartmental committee established for the purpose, although this might prove clumsy and involve endless hassles. Or it could be done in the Executive Office of the President, possibly in the Council of Economic Advisers or under the leadership of that agency. Objectivity and close tie-in with general economic projections might best be achieved in this case, but at the sacrifice of more detailed knowledge of natural resources. The task would fall naturally to a Council of *Resource* Advisers, should the bill calling for this be passed by the Congress. A workable arrangement, short of new legislation, would be to create by presidential action a resources council made up of top representatives from the Council of Economic Advisers and the Bureau of the Budget, from the Executive Office of the President, and from the Departments of the Interior, Agriculture, Army, and Health, Education, and Welfare, the so-called resource departments, preferably with an independent chairman appointed by the President to the White House staff for this purpose. A council of this sort would have to have some professional staff and be able to call on departments and agencies for assistance. Presumably, it would do other things besides furnishing a long-range demand-supply framework; it might make policy studies and provide guidance; and it might evaluate and perhaps coordinate development programs.[6]

To get the job done of creating the long-range perspective and framework within which alternative policies and administrative actions can be conceived and tested is the important thing. Precisely where it is done—in connection with the Council of Economic Advisers, by a new council of resource advisers of some sort, or through some combination—is also important, but is open to choice.

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[6] Shortly after the draft of this paper was completed, President Kennedy recommended a strengthening of the Council of Economic Advisers "to report to the President, the Congress, and the public on the status of resource programs in relation to national needs." He also recommended that a Presidential advisory committee be established under the Council, representing the resource agencies of the government. Message to the Congress, dated February 23, 1961.

Reviews of Books and Documents

And Not a Drop to Drink: Water Resources Planning and Administration

By Maynard M. Hufschmidt, Harvard University

The Upstream-Downstream Controversy in the Arkansas-White-Red Basins Survey, by Irving K. Fox and Isabel Picken. Inter-University Case Program, ICP Case Series No. 55. University of Alabama Press, 1960. Pp. 53. $1.00.

Comprehensive River Basin Planning: The Arkansas-White-Red Basins Inter-Agency Committee Experience, by Robert H. Pealy. Institute of Public Administration, The University of Michigan, 1959. Pp. 74. $2.00.

River Basin Administration and the Delaware, by Roscoe C. Martin, Guthrie S. Birkhead, Jesse Burkhead, and Frank J. Munger. Syracuse University Press, 1960. Pp. 390. $5.00.

Water for New York, by Roscoe C. Martin. Syracuse University Press, 1960. Pp. 264. $5.00.

How to organize and administer water-resource activities of government has been a pervasive question of public administration for at least the past half-century. Since the issue was first dramatized as an important problem of public policy by Senator Newlands in 1907 as a part of the conservation crusade, many specific proposals have been made for reform. Yet the basic administrative structure that prevailed then still exists today. With the major exception of the TVA, Federal responsibility for water-resource development remains, for the most part, in the hands of the Army Corps of Engineers nationwide, and the Bureau of Reclamation in the seventeen Western States and Alaska. Other Federal agencies, in the Departments of the Interior, Agriculture, and Health, Education and Welfare, continue to have important roles; indeed the role of the Department of Agriculture has grown apace in recent years with the expansion of its small-watershed activities. At the state level, water-resource functions also continue to be dispersed among a number of agencies concerned with specific purposes, such as pollution control, navigation, flood control, irrigation, hydro power, and small watersheds. In fact, when tested against the diversity and importance of the problems and opportunities and the sheer number of individual administrative units concerned, we appear to have lost ground during this fifty-year period.

Why has this been so? Why has so little progress been made in rationalizing water-resource organization? One view has it that the combination of political strength in Congress of the established agencies and the strong preference for the status quo of the affected interest groups has been the stumbling block. Holders of this view suggest that a major reform such as establishment of the TVA was possible only under unusual conditions of national stress when the influence of the interest groups and established agencies was temporarily neutralized. No change of similar scope, it is emphasized, has been possible before or since. For example, Senator Newlands' proposal for a waterways commission was never put into effect in spite of ten years of unrelenting effort on his part and the support of the Wilson Administration. Also, the backing of the Harding, Coolidge, and Hoover Administrations, plus the best efforts of the efficiency and economy groups were not sufficient during the period 1920-1932 to obtain consolidation of the water-resource activities of the Corps of Engineers and Bureau of Reclamation. Later attempts at coordination during the New Deal period by the National Resources Planning Board came to an end

when this agency—a favorite of President Roosevelt—was abolished by Congress in 1942, partly at the instigation of water-resource interest groups. Turning to more recent times, the recommendation of the First Hoover Commission for merger of water-resource agencies was never seriously considered by Congress; the attempt by President Truman to establish a Columbia Valley Administration on the TVA pattern was also thwarted by Congress; and the recommendations of the President's Water Resources Policy Commission (1950), Missouri Basin Survey Commission (1952), and the Presidential Advisory Committee on Water Resources Policy (1955) for river basin commissions were ignored. In all of these cases, opposition of the established agencies and major affected interest groups is usually given as the principal reason for failure.

But there is more to the problem than merely the opposition of status quo groups. Perhaps the proponents of change have not had clearly in mind what they were trying to accomplish; or, at least, they have not been able to explain their objectives to the affected public and the Congress in terms that would command public support for remedial action. The general rationale of most reform proposals since Newlands' has been about as follows: the physical nature of water resources requires that planning and execution of use and control measures be "comprehensive" in nature, encompassing at least the affected river basin and involving all relevant purposes. This "comprehensive," "multiple-purpose" nature of the problem requires unified or at least coordinated administration of water-resource activities, whether strictly federal or involving those of the states, localities, and private interests as well. Because water-resource activities are scattered among so many agencies—local, state, and federal—adequate improvements can be gained only by changing the existing pattern.

Major Approaches to Reform

But this is about the extent of the agreement among proponents for reform. Three main approaches emerged, each stressing a somewhat different aspect of the over-all problem. The first of these, as exemplified by the formulae of Newlands' waterways commission, the drainage basin committees of the National Resources Planning Board, and the latter-day river basin commissions placed emphasis on the *coordination* of the *planning activities* of existing agencies at the river basin level. Implicit here were the assumptions that planning could feasibly be separated from development and operation, and that, once the plans of the individual agencies were brought into proper relation with one another, an effective river basin plan would emerge as a basis for individual development and operation by existing agencies.

In contrast, the second approach, taking its cue from TVA experience, deemphasized planning as a separate step and placed reliance upon the combining of research, planning, development, and operation into *unified management* of the water resources of a *river basin* or *region* by a single agency endowed with broad powers. Implicit assumptions here were (1) that sensible and workable regional boundaries could be established for such agencies throughout the nation, and (2) that these independent regional agencies could be given effective policy direction at the national level without imposing a super water-resource agency between the regional authorities and the President.

The third or single national agency approach placed emphasis on *unifying* planning and development *procedures* and *policies* on a *national* basis. Planning, development, and operation were considered inseparable functions, but the river basin or regional unity stressed in the other approaches was a subordinate objective, to be attained by appropriate decentralization of the functions of the national agency.

The problem of administering water resources obviously involves both unified *river basin management* (including planning) and uniform *national policy* and *procedure*. But this total objective never clearly emerged from the welter of individual proposals for reform. Unable to present a clear image of a worthwhile goal, proponents for change have been ineffective in the presence of the powerful forces supporting the status quo.

The books reviewed here bear directly on this central issue of the goals of government organization for water resources. The studies by Pealy, and Fox and Picken of the experience of the Arkansas-White-Red Basins Interagency Committee (hereafter called AWR

Committee) deal with the *planning* function, essentially within the context of status quo organization. The Martin, Birkhead, Burkhead, Munger study of Delaware River Basin organization is concerned with *unified management* (including planning) of a river basin, within the context of new organization forms. And the Martin book on administration of the water resources of New York State deals with the problem of achieving uniform policies and planning procedures for the State as a whole—a microcosm of the national problem in this regard.

Framework for Analysis

As a basis for analyzing the findings of these books, I set forth the following framework for the governmental water resource function in the United States. Federal, state, and local governments are all assumed to be concerned with the planning, development, and operation of water-resource programs; further, it is assumed that an appropriate division of functions among these levels of government can be determined. Assumed also is the ability to define the central physical and economic relationships of water resources in such manner that the appropriate planning region—river basin, group of river basins or other construct—can be delineated. Finally, functions are assumed to be divided on a hierarchical basis, as follows: (1) broad national (or state) objectives and general limits of water-resource development are set at the highest level—the President and Congress (the Governor and Legislature); (2) detailed goals, policies, procedures, and standards are derived from these broad objectives and limits by a "central administrator"; and (3) water-resource development plans are prepared and carried out by "regional administrators," in accordance with these detailed guide lines.

The assignment of the "central administrator" at the national level can then be stated as follows: to assure that water-resource systems, nationwide, are planned, built, and operated so as to attain the specified national objectives in the highest degree (in other words, to maximize net benefits in terms of a function incorporating the national objectives) subject to the specified general limits. National objectives may be, for example, economic efficiency, income redistribution to groups or regions, and national or regional economic growth. Similiarly, the "regional administrator" has the assignment of maximizing net benefits in terms of the national objective function subject to the detailed guide lines set by the "national administrator." This latter assignment obviously implies that uniform goals, policies, procedures, standards and limits prevail for all regions, and that the physical and economic relationships that exist in the river basin region be taken into account to the extent required in determining the proper combination of measures and purposes that will maximize net benefits from the system. A third implication is that, because water-resource activities are continuing programs, the processes of planning, development, and operation are to be dealt with together.

By analogy, state "central administrators" of water-resource activities and their intrastate "regional administrators" would have similar assignments: to maximize the value of a specified objective function, subject to limits and guides imposed by State policy and the Federal government.

The "central administrator" can be the Chief Executive, a single department head, an interagency committee or other administrative body; similarly, the "regional administrator" can be an independent agency, a single regional officer, a regional interagency committee, or some other variant of organization.

The AWR Committee Experience

In July 1950 President Truman, putting into effect a provision in the Flood Control Act of that year, directed that an interagency committee be established, under chairmanship of the Corps of Engineers, to carry out an integrated study of the resources of the Arkansas, White, and Red River Basins. This assignment took five years for the Committee to discharge, at a cost of several million dollars. The study represented the first attempt to prepare a comprehensive river basin plan by concerted action of Federal agencies and the states and, as such, is of major significance in river basin planning.

Both the Pealy report and the case study of Fox and Picken have as their purpose an analysis and evaluation of the performance of the interagency committee. While the Pealy

study deals only in general terms with the over-all organization and operation of the Committee and its staff, the Fox-Picken report probes deeply into a specific planning problem faced by the Committee—the integration of the upstream flood management plans of the Department of Agriculture with those for downstream flood management by the Corps of Engineers. This report is especially valuable in revealing the inner Committee workings because both Mr. Fox and Miss Picken were active participants in the AWR survey over most of the five-year period of study.

The Lesson from AWR Experience

The lesson that emerges from these two studies of the AWR experience is that the Committee members and their staffs attempted to do more than was possible with the administrative machinery at hand. A basic decision taken by the Committee at the outset was to prepare a single, integrated plan in which all projects regardless of proposing agency would be subjected to the same criteria of evaluation, and the hydrologic relationships among individual projects of the system, again regardless of agency, would be determined and taken into account. In terms of the framework for analysis presented above, the Committee resolved to attempt to devise a single plan that would maximize net benefits from all projects regardless of sponsoring agency, by taking into account all important physical and economic factors that united the various elements of the system. While this task is feasible for a single agency, it can only be accomplished where several agencies are involved if, first, the agencies agree on a common set of standards and evaluation criteria and, second, they cooperate in making system studies through which the physical and economic relationships among the system units can be determined. The interagency committee provides a poor basis for performance of these necessary steps.

In fact, these requirements for a specified plan were never fulfilled by the Committee, and it was forced to settle for the lesser objective of attempting some measure of coordination among the individual agency plans.

Evaluation of the AWR Committee Performance

In their evaluation of AWR Committee performance, Fox and Picken conclude (p. 49) that the planning effort was a "time consuming, cumbersome and costly process." This was inevitable because of the difficulties involved in obtaining agreement on many important issues from *seven* federal and *eight* state committee members, many of whom had to obtain concurrence of the agencies which they represented. In general, Fox and Picken hold that interagency coordination at field level is ineffective where basic policy differences persist among federal agencies. If such policy differences cannot be resolved in timely fashion at the Washington level, coordination of the many planning details at field level will break down. Given the existing distribution of Federal water-resource planning activities, Fox and Picken hold that the role of federal interagency committees at field level should be limited to (1) establishing simple and effective arrangements for coordinating field-level investigation and planning activities, and (2) identifying and analyzing policy issues that interfere with coordination of agency plans and pressing for resolution of these issues by those responsible. Other committee goals, such as actual preparation of final plans, are held to be unrealistic unless basic changes in organization and authority accompany the setting up of interagency committees.

As a corollary they point out that, in spite of strenuous efforts to prepare a single Committee plan for each sub-basin involving upstream and downstream flood-control works, the best that AWR could do was to present separate plans by Agriculture and the Corps of Engineers with some agreements on adjustments where the agency plans overlapped.

In terms of our framework, an interagency committee of the AWR type (the "regional administrator") cannot perform a maximization assignment because it lacks a set of detailed objectives, policies, and procedures presented by Washington (the "central administrator"). The Committee cannot therefore deal effectively with the detailed physical and economic relationships of the river basins within the context of a unified plan.

This deficiency was particularly acute in the AWR because of the lack of agreement among engineers, hydrologists, and land management specialists in the Corps of Engineers and Agriculture on the nature of the upstream-downstream flood control problem and

the effectiveness of alternative measures for alleviating floods—the watershed treatment measures and small upstream reservoirs favored by Agriculture versus the major downstream river control structures (levees and large dams) favored by the Corps of Engineers.

While Pealy agrees with the Fox-Picken conclusions on the inefficiency of the interagency committee method and the shortcomings of the final AWR plan, he points out (p. 56) that the study produced "a better report than had previously been accomplished by any other major river basin planning effort." And, he notes: "At least the AWR report shows with considerable clarity, detail, and precision in what respects project coordination has *not* been achieved [emphasis in original]. Certainly this is a milestone in major river basin planning!"

Pealy also cites the AWR experience as pointing up the inherent limitations of the interagency committee device for river basin planning (pp. 58-59). An independent chairman appointed by and responsible to the President would be a helpful improvement; the negative experience of AWR with a Presidential adviser is considered to be inconclusive as the adviser was appointed late in the game and had only a restricted role.

Pealy suggests that the concept of comprehensive planning needs extensive clarification before effective basin plans can be prepared. The AWR experience can be helpful here. For example, AWR's identification of interagency conflicts and issues made possible an evaluation of the shortcomings of any patchwork plan based on mutual toleration of individual agency proposals. Also, AWR called attention to the need for much more technical research in meteorology, hydrology, watershed management and the like, to aid in better plan formulation. Pealy concludes by noting that Congress is not likely to adopt a single national water policy valid for all regions and purposes and that, accordingly, river basin planning agencies will continue to be confronted with the problem of defining values and objectives on their own for their particular studies.

Here Pealy identifies a crucial problem applicable to all basin planning—the obtaining of clear statements of the underlying objectives to be achieved. In terms of our framework this is the problem of establishing the objective function, which clearly is a task for Congress and the President rather than for river basin planning agencies. If Pealy is correct that the highest levels of government are not likely to establish such objectives, it is hard to see how consistent basin plans can be evolved.

The Pealy report is much too brief to present in sufficient detail a satisfactory analysis of the performance of this fantastically complex Committee. The Fox-Picken study, although ostensibly of narrower scope, gives a much more detailed treatment and analysis of Committee operations. Taken together, the reports provide a reasonably complete picture of AWR Committee performance, although the criteria or standards for judging the Committee's performance are not set forth as clearly as they might be. The Fox-Picken study represents a valuable addition to the case studies in resources administration of the Inter-University Case Program.

The Delaware Basin Problem

In contrast to the studies of AWR experience which analyzed the past performance of a planning agency, the book by Martin, Birkhead, Burkhead, and Munger, *River Basin Administration and the Delaware,* is concerned with developing proposals for future water-resource administration in the Delaware Valley. As an outgrowth of the concern for effective development of the river basin by the Governors of the four Delaware Basin States and the Mayors of Philadelphia and New York (New York City obtains much of its domestic water from the upper Delaware basin), the authors were commissioned in 1957 to study the problem of governmental organization for development of the basin's water resources. This book presents, in revised form, the report made in response to that assignment.

This is the first time in U. S. experience, to the reviewer's knowledge, that a serious attempt has been made to examine the major physical, economic, institutional, political, and administrative factors bearing on the problem of government water-resources administration of a specific river basin prior to major development. (In the only other case, the Missouri Basin Survey Commission study, major development was well under way by

established agencies, and the Commission was seeking for means of improving administration within that context.) In the usual case, some form of organization—valley authority, interstate compact agency, or interagency committee—is proposed with little more than the biases and ideological preconceptions of the proponents to recommend it. In this instance, in contrast, the recommendations for organization and function were derived from the results of the study.

Viewed in this light the book is indeed impressive. The major water-resource problems and opportunities of the basin are first presented as a background for analysis of the administrative task to be performed; certain criteria for an effective river basin administration are set forth; and, based on an analysis of U. S. experience in water-resource planning and administration, various forms of administrative organization are evaluated in accordance with these criteria and also in terms of political feasibility. A choice is then made of an organization form to be recommended, the functions and powers that this organization should have, and a strategy for obtaining federal, state, and local authorization and consent for the recommended administrative arrangements. Throughout, facts are presented, findings marshalled, and conclusions pointed toward the objective of recommending in specific terms and in detail the organization and functions of a water-resource agency for the Delaware.

Selecting Forms and Functions in River Basin Administration

After briefly surveying the advantages and disadvantages of a regional administrative agency for water in general, Martin and his colleagues set up two contrasting approaches to choosing the form and functions of a river basin administration. The first approach assumes that river basins have certain significant features in common that lead to common problems and that regional problems can be solved by rational action.

The second approach emphasizes the physical, economic, social, and political characteristics of the individual basin. It rests on "the hypothesis that a particular river basin is worthy of study in its own right, that certain significant problems are likely to emerge from such study which require regional attention, and that, if this proves to be the case, an administrative agency should be devised especially for the region at hand." (pp. 106-107)

The analysis and recommendations of the book are based on this second approach; indeed, this was almost required by the terms of reference of the study; no extensive analysis would be required to prescribe a valley authority for the Delaware, as the first approach would dictate.

American experience in administration of river basins is briefly explored in Part IV for intrastate basin developments—the Grand River Dam Authority, Oklahoma, Muskingum Conservancy District, Ohio, Central and Southern Florida Flood Control District, and the Lower Colorado River Authority, Texas—and three interstate basins—the Tennessee, Missouri, and Delaware. With the exception of the Delaware, to which an entire chapter is devoted, the analyses are largely short summaries relying heavily on other published studies.

River Basin Control System Problems

There is a brief but interesting treatment (chap. 16) of problems of operating a river basin control system, with illustrations of control of water in the channel drawn from the Tennessee, Missouri, Columbia, and Ohio River experiences, and a discussion of control of withdrawals and diversions illustrated by the case of the Delaware River Master. This Part concludes with the lessons the authors draw from American experience. The authors find that regional action toward river basin development is inhibited by the amorphous and undefined image that the general public has of the river basin, the complexity of problems encountered in the typical river basin, legal difficulties stemming from our federal system, and the strong grassroots tradition of the people. In contrast, regional action is induced by crisis and catastrophe (war, natural disaster), economic prosperity or depression, presence of effective leadership, and the availability of massive subsidies. They find that few examples of successful State river-basin organization exist, although the unfolding developments in California, with its major development program, and in New Jersey, with its State program for providing reservoir storage for municipal and industrial water sup-

ply, bear watching. The interstate compact approach to broad-scale development of interstate basins has not been successful to date.

In contrast, the Federal government has been the moving force in most significant basin developments, although major problems arise in obtaining state and local cooperation in federal development, and in coordinating the activities of the many Federal agencies involved. American experience yields inadequate data on the possibilities of federal-state-local collaboration in establishing and operating river basin organizations. Finally, while the experience of any one U. S. river basin (such as the Tennessee Valley) cannot be transferred to any other intact, certain fundamental principles of river basin organization are generally applicable to river basins and thus are transferable.

Administrative Structure for the Delaware Basin

Martin and his colleagues present their recommendation for an administrative structure for the Delaware Basin in Part V. It is a two-phase plan, the first to consist of a transitional Delaware River Agency for Water (DRAW) established by federal law, the second to be an interstate compact agency, in which the Federal government is associated with the four states, to replace DRAW. Three reasons are given for this serial approach: (1) a federal agency can be set up more quickly than a compact can be negotiated and approved by the five jurisdictions; (2) large capital outlays, for which the federal government is the major source, will be required at the outset, and Congress would be more likely to vote such funds to a federal agency than to a non-federal instrumentality; and (3) important national interests in water resources will be built into the program at the start, while the second phase will allow orderly blending of state and national interests within the framework of the federal-interstate agency.

DRAW would be headed by a five-member policy-making commission. While all members of the Federal agency would be appointed by the President, four are to be from nominees selected by the Governors. Administration would be in the hands of a general manager with full administrative powers. The agency would be given extensive powers of research, planning and design, construction, and operation of water control structures and related facilities. In addition, it would have powers to enforce standards of water quality and to control withdrawals and diversions from the waters of the basin.

The interstate compact agency to be set up as a second phase would take over the organization, staff, powers, and functions of DRAW intact. Unlike the traditional interstate compact, the Federal government would be a full-fledged participant. In effect, federal and state powers would be merged, and the burden of responsibility shifted from the Federal government (DRAW) to this mixed federal-state organization. In conclusion, there is a discussion of the problem of implementing the recommendations. In noting that the report has taken the factor of political feasibility into account, Martin and his colleagues write:

> In the sense that political considerations have been taken into account, this report is not notably different from others; for virtually every set of recommendations growing from a similar study has involved political judgments. The difference in approach of this study is that *systematic* attention has been given to the politics of water-resources administration from the beginning. The opinions expressed were not casually formed on the basis of limited personal experiences or observations; they were based upon as extensive research as time and money permitted. Nor are they simply incorporated into the findings and recommendations as unexpressed reasons for saying what is said; in so far as possible they have been made explicit and labeled for what they are, judgments concerning the political limits upon the range of possibilities and the alternatives at hand. The advantages of such an approach are twofold: the accuracy of the political judgments can thereby be appraised, and their impact upon the final conclusions can be separated out for independent consideration.

What is the significance of these findings and recommendations in terms of our framework for analysis? First, the integrity of the unified planning function is preserved; planning is to recognize the basic physical relationships, and is to be centered in a single basin agency. Second, the interrelationships between the planning, development, and operation functions are recognized by endowing the basin agency with all of these functions. The basin agency will be in a position to devise a single workable objective function whose value it can seek to maximize. Less

clear is the relation of this objective function to over-all national objectives for water-resource development. Presumably, the Federal agency DRAW could be held to goals, policies, procedures, and standards common to other Federal water-resource agencies, but it is not evident how the interstate compact agency could similarly be controlled. This might be done by periodic federal review of plans and programs of the basin agency and the conditioning of federal grants-in-aid on the meeting of certain standards and objectives set by the federal government. Thus, while not all of the administrative problems inherent in the theoretical model are solved by the recommended pattern of organization, some of the most important of these are.

Of interest is the fact that the Delaware Basin states have chosen to forego the transitional phase recommended by Martin and his colleagues and to move directly to establish a federal-interstate compact agency. A draft compact has already been approved by the governors of the four states and the mayors of New York and Philadelphia and ratified (late May 1961) by the States of New York and New Jersey. The compact is now being considered in the Executive Branch of the Federal government and by Congress. If timely approval is obtained from Pennsylvania and Delaware and if the consent of the Federal government can be obtained for this unusual conjoining of federal and state powers, we will see an early test of a new form of regional water development agency under extremely favorable local circumstances.

State Experience

The fourth book, *Water for New York*, by Martin, is a study in some detail of the administration of the water-resource activities of New York State. Increasingly, the states have become minor partners in the water-resource game, giving way both to expanding federal programs and the energy of local governments to fill specific needs. The experience of New York State in water-resource administration provides an interesting case for study because of the number and diversity of water programs involved. The Martin study presents a detailed description of the State's major programs, four cases of water-resource administration in action discussed in some detail, and suggestions for an approach to administrative reorganization.

The four cases provide informative background information on actual operation of some of these agencies. From this, Martin has distilled a number of general hypotheses on the nature of administration. These include hypotheses about the importance for administration of the total environment, the high degree of complexity of administrative action, and the interagency and intergovermental character of administrative action.

To summarize the performance of a miscellany of diverse agencies and draw meaningful conclusions therefrom, as Martin has done in this book, is not an easy task. One gains the impression that some of his conclusions flow not so much from his analysis of agency performance as from his broad knowledge of the field of water-resource administration. This is but to say that the Delaware book should be read along with this book in order to obtain full appreciation of Martin's conclusions here.

Prospects for the Future

The four studies reviewed above cover most of the ills that have beset water-resource administration in this country. But, they point also to the road to improvement, in part by showing us certain directions to avoid. For example, the studies of AWR experience show that interagency committees, at least the old models, are not likely to provide unified basin plans. The Delaware study holds that the interstate compact road, if pursued by the States alone, is not likely to lead to the kind of integrated river-basin development that is required. Strong federal participation in interstate compact agencies would be required if this form of organization were to have any chance of success, but this raises serious problems involving the merger of federal and state authorities. And the study of New York State administration shows that reliance on the states alone to provide leadership in integrated water-resource development is indeed a weak reed. California is probably an exception here.

Long-Term Approaches

Two long-term approaches remain. One would require a consolidation of Federal water-resource functions at the top, and their

administrative decentralization to major regions or river basins. The other approach is the establishment of regional water-resource agencies, either Federal as is the TVA, or by interstate compacts in which the Federal government plays a strong role. In some cases, such as California and Texas, a regional agency can be the creation of a single state. These two approaches need not be mutually exclusive. It is possible to visualize them as mutually supporting. For example, federal water-resource functions could be merged and decentralized on the one hand and, on the other hand, regional agencies could be established for specific basins or groups of basins. As these were formed, they could assume the planning and development responsibilities for their areas, relieving the central agency of these duties. The role of the central agency would gradually be shifted toward the appropriate channeling of federal investment funds to the various regional agencies. In terms of the framework presented earlier, one could see the process working somewhat as follows: The national agency would set detailed planning objectives, standards, and criteria for regional agencies, based upon broad objectives established by the President and Congress. Regional agencies would prepare basin plans providing maximum benefits in terms of the given objectives. These would form the basis for the allocation of federal funds to regional agencies. Such allocations would depend on the relative benefits expected to flow from these regional developments. Each regional agency would have the task of maximizing benefits from its development in the light of its budget allocation. This might well be an iterative process.[1]

The above pattern is merely suggestive. Perhaps an opportunity to experiment with various patterns is now at hand. In his message of February 23, 1961, to Congress on natural resources, President Kennedy asked for Congressional authority to establish "planning commissions for all major river basins where adequate coordinated plans are not already in existence." The purpose would be to achieve the goal urged by the Senate Select Committee on National Water Resources that comprehensive river basin plans be developed for the entire nation by 1970. If the lessons revealed in the studies reviewed here are heeded, the opportunity provided by this renewed emphasis on comprehensive planning to make significant advances in the quality of river basin planning and in organization and administration of water-resource activities may be realized in the next few years.

[1] This brief outline of a national-regional planning process is drawn from the report of Harvard Water Resources Program, *Design of Water Resource Systems* (Harvard University Press, to be published in 1961).

Deficits Are Deficits, Aren't They?

By William R. Monat, The Pennsylvania State University

Trends in Government Financing, by Morris A. Copeland. Princeton University Press, 1961. Pp. 210. $5.00.

Few tenets of our conventional wisdom are more fiercely embraced by citizen and public official alike than the self-evident iniquity of government debt. It is an imperative more stoutly asserted even than those other popular touchstones of financial morality: taxes are too high, government is wasteful, extravagant, and inefficient, or the expenditure coat must be cut to fit the revenue cloth. One is always in company with the angels when denouncing public deficits for, as everyone *knows*, a business losing money is not long for the market place and the family must balance its budget. Those canons of fiscal accountability observed by the family and the entrepreneur are not less applicable to the government: *ergo*, income must *at least* cover expenditures. While small loan companies, our national credit-plan culture, the railroad industry, and the Chrysler Corporation seem oblivious to this revealed truth, the guardians of governmental financial integrity have no doubts: there is either a debt or there is not a debt, and if

there is one, it is by definition an evil to be exorcised.

It is a minor delight, therefore, to come across a study of public debt that somehow avoids righteous sermonizing on the perversity of government finance at the same time that it also refrains from pleading the case of the new economic orthodoxy of "growthmanship." *Trends in Government Financing* is, despite its apparently misleading title, an informative and suggestive inquiry into the growing importance of American governments—federal, state, and local—as borrowers and debtors. Professor Copeland quietly but effectively applies some useful conceptual approaches to the recurring phenomena of government deficit, interprets and projects an imposing accumulation of financial statistics and, in the process, gently inters a few of the more persistent myths purporting to explain the arcana of government finance to the uninitiated layman.

Trends in Government Financing is the seventh in a series of Studies in Capital Formation and Financing undertaken by the National Bureau of Economic Research. Unlike most of its predecessors which dealt with the private sector, the Copeland monograph is concerned directly with the long-term financial requirements of government or, more concisely, government needs for borrowing in the loan and security market. In exploring the patterns that public debts have assumed over the years, Professor Copeland displays an admirable penchant not to draw philosophical and polemic inferences or to hypothesize the economic and political consequences flowing from those revealed trends. For this restraint the searcher after "true facts" can be thankful. Being limited essentially to description and economic analysis, however, the study has, inadvertently perhaps, diluted its utility as an effective guide for government policymakers. But, more about that shortly.

Things Are Not Always What They Seem

The universe of discourse within which the ever-obliging man-in-the-street thinks and acts marks him as something of an economic ignoramus. Even the more knowledgeable businessman, accustomed to thinking in terms of ledger sheets and accounting concepts, of capital investments distinguished from operating expenditures, of depreciation calculations, and the relatively tangible presence or absence of profit, may experience bewilderment among the ambiguities and contingencies that characterize government financing, particularly its deficits. Simon Koznets' "Foreword" to the monograph admits that in designing the study an underlying analytical problem emerged: that of "defining properly the governmental deficit that represented a draft upon the supply of loanable funds—as distinct from variant definitions of governmental deficit that have been formulated and discussed, largely in connection with budget planning and fiscal legislation." This difficulty in deciding what a deficit really is was in part a function of the discontinuities in available data; it was also, I suspect, a product of the comprehension gap that yawns between the system of government financing and the outside world.

At the risk of oversimplification, it may be convenient to view *deficit* as an accounting concept. The dimensions of deficit or surplus then rest upon what a system of accounts includes and excludes. Budget accounts usually exclude significant funds containing handsome government assets. Few governments, and these largely at the municipal level, possess a genuine capital budget system that clearly delineates capital investments from operating expenditures; yet such a distinction unveils other appreciable public assets hidden by exclusion from ordinary budget accounting. Thus, a budget deficit or surplus reflects the condition of *budgeted* funds, usually those that finance general government operations. By this measure, the federal government and not a few state governments have suffered chronic budget deficits for several years. Indeed, the State of Michigan in 1959 temporarily exhausted its general operating funds after showing year-end budget deficits for several fiscal years. This depletion forced a delayed pay period and deferred payments to vendors, contractors, local governments, schools, and universities. Yet, during the same period and also at the end of deficit fiscal years, the state treasury consistently reflected a stable balance of at least $100 million. Pennsylvania has come perilously close to a comparable crisis on several occasions, and Illinois faces the prospect of Michigan's grim fate this year. Only the recluse is unaware that the federal government has lived with budget deficits except for a few surplus years since 1940.

At no time, however, were these governments "broke" or "bankrupt," the tribunes of the conventional wisdom notwithstanding. While the federal government often produces a deficit from whatever point viewed—and except during wars, usually a manageable deficit—such has not been the case for the states. The total assets of state governments—capital investments in highways, bridges, schools, hospitals, etc., securities portfolios, retirement and insurance funds, and cash balances in operating funds other than the overdrawn general funds—were many times the amount of the budget imbalance. While these budget deficits are more than a point of view, i.e., they have profound impacts on state operations and exert irresistible pressures on policy-making, they do not proclaim state insolvency by any means.

Budget deficits, it is apparent, need not represent "a draft on the supply of loanable funds" since no increments are added to overall net governmental debt and certainly do not provide an adequate measure of a government's financial condition. Copeland, therefore, has adapted an economically more sophisticated and meaningful measure by using the Flow of Funds reports of the Federal Reserve Board. The Flow of Funds deficit computation has significant advantages. It permits the calculation of *net* as opposed to *gross* debt by including sources of funds and uses of funds not encompassed in budget accounting. It *excludes* sources and uses of funds of a "financial" character; that is, those expenditures and receipts that come from the purchase or liquidation of securities and other financial assets and the increase or retirement in debts outstanding. The Flow of Funds nonfinancial deficit computation, therefore, is "the excess of nonfinancial expenditures or uses of funds—chiefly payrolls, procurement and construction costs, aids and benefit payments, interest, and tax refunds—over tax collections and other nonfinance type receipts or sources of funds." Unlike the federal budget computation, this includes OASI taxes and funds, unemployment compensation taxes and funds, and the funds of government business-type and credit agencies. At the state and local level the nonfinancial deficit computation encompasses all trust and insurance funds, including retirement funds, sinking funds, the funds of government enterprises, and the substantial endowment and investment funds.

Using the concept of *net* nonfinancial debt as a measure, interesting patterns emerge that remain hidden in the budget or even the cash accounts. At the federal level, substantial budget deficits occasionally mask nonfinancial surpluses. In 1946, for example, a $2.5 billion budget deficit snatched public attention from a sizable $5 billion nonfinancial surplus. Net state and local debt was negligible during the Thirties; in the aggregate, net debt declined during the Forties; and even in the ebullient Fifties—the decade of revived state and local government activity—net debt scarcely exceeded what it had been in 1930. It would appear that while deficits are not a matter of opinion, they are often a matter of perception.

Patterns—the Obvious and the Not-so-Obvious

No one will be startled to read that there has been a long-term growth in government debt, both absolutely and relatively. Less obvious, but certainly not a revelation, is the fact that there seems to be only slight correlation between borrowing by governments and their capital formation, although a more discernible relationship obtains among local governments than at the state and federal levels. Local governments and, to an extent, state governments usually borrow for construction—to build highways, hospitals, public buildings, and the like. And what knowledgeable citizen will react with surprise to the fact that the major thrusts producing increments in net federal debt have been wars, depressions, and countercyclical fiscal policies.

What may be somewhat obscured by the over-all and generally familiar trends are patterns bearing some significance for the student and practitioner of government. Measured in terms of nonfinancial computations, Copeland concludes that "it seems reasonable to say that, on the whole and apart from the major step-ups in federal expenditures during the two world wars and the depression of the 1930's, it was possible approximately to match the sharp upward trend in government expenditures in the last five or six decades with an equal upward trend in tax revenues and other nonfinancial receipts." Except for these economically awkward emergencies, it

would appear, government in the aggregate has been tailoring its spending coat to fit the income cloth.

Even during wars, furthermore, there has been a growing reliance upon federal pay-as-you-go policies, each war since the War of 1812 relying less and less upon deficit financing. World War II was financed almost evenly by current receipts and borrowing, a small consolation associated with that holocaust. These fiscal advances were in large part the product of administrative and technological innovation such as the World War II introduction of withholding into the income tax program, the growing tendency to set tax revenues to meet obligational authority rather than appropriation objectives, and the Budget and Accounting Act of 1921.

But there is more of interest revealed. Wars and depressions have had somewhat different, but perhaps not too surprising, ramifications at the state and local level. "While there was some net state and local borrowing during World War I, the rate of borrowing seems to have been retarded. And between 1929 and 1939 state and local net debt increased by only about 6 per cent. Then during World War II net state and local debt was reduced to a negligible amount. Even in 1950 it was less than it had been before World War I." In part, this flows from the dominant federal role under emergency conditions; it also reflects more permanent mutations in the governmental system.

As the student of federalism might anticipate, the dramatic transformations that have been wrought in the role of the central government and the pattern of intergovernmental relations during the past thirty years have had significant fiscal ramifications. State and local governments are less and less involved in major emergency spending, the type occasioned by economic calamity, as basic responsibility for nurturing economic stability and pursuing countercyclical policies have increasingly been pre-empted by federal programs. Countering this shift, however, may be the relative decline of cyclically insensitive property taxes as the dominant source of revenue for state and local governments and the growing importance to their revenue systems of taxes less immune to infection by economic fluctuations. Future recessions, and certainly depressions, are likely to wreak greater devastation on state and local revenue programs, thus forcing these governments into emergency deficits even though no substantive countercyclical activities are initiated or financed by them.

Ironically, the villain often condemned by the conventional wisdom as the chief culprit in producing peacetime federal deficits is, in some part, innocent of the indictment. Countercyclical policies, at least during the Thirties, were so compromised by the pressures for a balanced budget that they did little more than increase per capita disposable personal income and thus augment aggregate demand. And during the less catastrophic recessions since World War II, monetary-credit policies and the built-in stabilizers have been rushed into the breach; deficit-laden fiscal policies involving public works, and other overt expenditure activities have not been mobilized for action. The appeal of the balanced budget remains undiminished, although it would likely succumb if conditions deteriorated precipitously. Increasingly, during the depression, it should be added, the costs of these emergency programs were covered by increased taxes, and with the emergence of the built-in stabilizers—the farm programs, unemployment compensation, and the categorical aid programs—much of the cost is financed through regular and special tax levies.

Still ambiguous and inchoate are the financial changes implicit in the widening scope of federal and state aid activities and the proliferation of special government districts. More and more, state governments are assuming broader responsibilities for financing local activities, and the federal government's role in extending financial assistance to both state and local governments grows each year both in amount and range. The emergence of special districts, including school districts, and authorities has had, among other effects, the bold purpose and obvious tendency to redistribute the deficit pattern among local governments. Often created to evade rigid and unreasonable municipal and state debt ceilings, special districts and authorities assume debt responsibilities that might well devolve on local and state units in the absence of constitutional, charter, or statutory restrictions.

Prospects and Predictions: Partly Cloudy

One expects a scholar to make projections and proffer his best judgment concerning what the future holds. The line between pre-

diction and prescription is indeed fine; the temptation to ignore its existence is overpowering. Professor Copeland, fortunately, seems aware of both the difference and the temptation. He succumbed with restraint.

His most interesting recommendations have been echoed by others and have met with less than stunning acceptance despite their cogency and reasonableness. "Liberal" economists increasingly urge that legislatures, particularly the Congress, deal separately with tax policy and tax rates. This would have at least one great advantage: the lead time between the apparent need for more revenue and the collection of that revenue would be pared down. Implicit in this separation is the seed for another of his proposals. Particularly during war and other emergencies where expeditious action and decision are at a premium, the drawn-out debate and discussion inherent in legislative deliberation tax government's capacity to perform. Congress has been willing to delegate broad discretion to the President in the appropriation process; it has been adamant in holding on to its tax-writing powers. Copeland in company with other economists urges the use of contingent tax legislation, that is, bestowing upon the executive discretion to adjust tax *rates* under specified and crisis situations.

Again in a common cause with many of his profession he finds great attraction in the capital budget. This appeal, it should be noted, has not met with apathy from public administrators and many public officials. The capital budget has found greater utility and acceptance at the state and particularly the local level than at the federal level, for administrative, political, and economic reasons. Less enthusiasm has been mustered, even among economists, for a federal capital budget. There remains, however, a pressing need to translate federal capital holdings (perhaps including even missiles and other "defensive" hardware) into identifiable assets that can be measured against expenditures and nonfinancial deficits so that an over-all balance sheet comparison of federal liabilities and assets can be obtained. Such a measure, Copeland suggests, could well place the federal debt in a perspective more congenial to the kind of relationship that General Motors, for example, asserts exists between its assets and liabilities. A capital budget *per se* is perhaps less important than a system of capital accounts.

Modesty Becomes the Economist

This was the underlying message that Jesse Burkhead left with his professional colleagues of the public finance fraternity as well as those of us not privy to this occult science when not too long ago he devoted several pages of this *Review* to suggesting a proper and necessary function for economics in the shaping of public policy. Do not defer to the economist, he admonished his readers, for authoritative demarcations between the public and private sectors or even conclusive choices among policy alternatives facing government executives and legislators. These awesome responsibilities remain within the orbit of political action and even if economists were able to deliver intimidating imperatives in this arena, it is doubtful that legislators and executives would surrender their cherished moments of decision.

Economists have and will increasingly have an essential contribution to render those who perforce must fashion the grand design and effective detail of public policy. In Burkhead's phrase, it is that of "informing government with economics."[1] While not of Platonic dimensions, this role calls for professional ingenuity, discipline, and integrity in addition to self-restraint. *Trends in Government Financing*, while not brilliantly provocative in the Galbraithian manner, displays those virtues of professional modesty and research solidity that mark the products of the National Bureau of Economic Research under whose auspices the study was undertaken.

One reacts with a certain unfulfilled feeling to the limited objective and narrow focus of the Copeland study and, for that matter, to many studies in public finance. Although Copeland displays a finer appreciation than do some of his fellow economists for political forces and the "realities" they create, his study at times seems to be designed without serious intent of accommodating these realities or the administrative artifacts they support. Constitutional debt limits, tightly locked, earmarked, segregated, and dedicated funds, the almost surrealistic mosaic of administrative organization that tends to inhibit effective executive leadership and coherent administra-

[1] Jesse Burkhead, "Informing Government with Economics," 18 *Public Administration Review* 340 (Autumn 1958).

tion, a burgeoning patchwork of local government jurisdictions in metropolitan areas—these are just some of the realities that confront state and local policy-makers and profoundly influence their fiscal programs. This coupled with inflexible revenue systems, often restrained by constitutional mandates, and the inherent "bias against adequate taxation" prevalent in state and local governments—so aptly labelled and described recently in *Fortune*[2]—make any rational system of state and local financial administration, including that of debt policy, exceedingly tenuous.

Federal financial administration is less circumscribed by restraints similar to the kind of restraints hobbling state and local governments. But even at the federal level political and administrative conventions limit the zone of maneuver for implementing desirable reforms such as a federal capital budget and contingent tax legislation.

Professor Copeland did not intend to produce a manual for government policy-makers and one should not take him to task for not doing what he did not set out to do. His monograph and its findings bear upon the "draft" that government deficits make upon the loanable funds in the country. Within these terms *Trends in Government Financing* constitutes a significant addition both to our knowledge and, particularly, to *how* we conceptualize and use that knowledge. Having granted this, however, a demur is hastily entered. As far as administrators and officials are concerned, a more orderly and coherent perception of the meaning and implication of government deficits is valuable, but it offers but little comfort to them as they wrestle with the arduous assignment of allocating scarce community financial resources among competing public activities. The hard fact remains: trust funds, dedicated funds, and capital assets cannot be tapped in most instances to finance operating budgets. So, deficits are still deficits; they do not disappear as political and administrative thorns through statistical sleight-of-hand.

[2] Robert Lubar and Charles Silberman, "The Taxes Closest to Home," *Fortune*, June 1959, pp. 106-109.

Science, Society, and Government

By W. V. Hurley, The Port of New York Authority

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"Perspectives on Government and Science," edited by Thorsten Sellin. *The Annals*, January 1960.

American Universities and Federal Research, by Charles V. Kidd, with foreword by Paul E. Klopsteg. Harvard University Press, 1959. Pp. 272. $6.00.

Science and State Government, by Frederic N. Cleaveland. University of North Carolina Press, 1959. Pp. 161. $3.50.

Hearings on Research and Development, in House Committee on Executive and Legislative Reorganization, 85 Cong. 2 sess. U.S. Government Printing Office, 1958.

Over the centuries, science and technology have played an increasingly important role in the affairs of men and the policies of nations until we have reached a point, unprecedented over the whole span of history, where every significant global decision is made

within a framework of such products of the scientist and engineer as thermo-nuclear bombs, supersonic aircraft, ballistic missiles and, more lately, earth satellites and space probes.

This is not to suggest that the effects and implications of science and technology are limited solely to matters of military significance or political consequence. Indeed, their primary significance lies elsewhere, for they constitute the very foundation on which the highly organized and extremely complex modern civilizations rest. In today's world, a vigorous technology lies at the root of economic strength as well as military and political strength.

All of this has not, in the past, been generally and consciously recognized within Western civilization. Instead, the progressive technology which produced the Industrial Revolution and the subsequent strength and wealth of Western countries was pursued essentially as an end in itself, usually by dedicated men acting in the face of strong resistance and against great odds. The underlying basic science primarily grew out of the European thirst for fundamental knowledge and respect for learning and education.

On the other hand, almost from its inception, the U.S.S.R. has realized that the development of a strong and dynamic technology is a vital prerequisite to the establishment of national strength. This was made apparent many years ago by the direction of Soviet science and industry and by public statements of Soviet intent. In 1930, for example, a British scientific observer, J. G. Crowther, had this to say on returning from a visit to the Soviet Union:

> . . . the endowments for scientific research are large, in view of the country's difficulties. They are probably larger in relation to the superfluous wealth than in any other country—What will come out of the Soviet's integration of Science, the State and Industry? In twenty years' time quite possibly the most powerful country in the world. In many parts, at present, only the scaffolding of the integration exists, but the idea seemed to me to be there. If the idea is successfully materialized, the rest of the world will not find the spectacle of a scientifically developed and armed people of over 100 million particularly comforting. . . .

This was a reasonably accurate forecast of our present *un*comfortable situation.

Over more than thirty years, the Soviet Union has maintained a determined and unswerving national effort to elevate its technology over that of the West. During the past decade, the fruits of this labor have been realized at an ever increasing pace and, in some areas at least, the goal has been attained.

Sputnik I was the Soviet calling card to a duel of national prestige, and Premier Khrushchev has made it abundantly clear that we are in a competition which is comprehensive of nearly every facet of national existence, whether we like it or not. Moreover, we can expect that the competition will be joined, in the not too distant future, by Communist China. Nor is the competition limited solely to that between communism and free enterprise. Many of our industries have already felt the impact of technological advance by non-communist countries, such as Japan and West Germany, on both our domestic and international markets.

We have since been treated to a proliferation of critical analyses of the relations of science, state, and industry in our own country, and the production of a great deal of associated data and discussion. A number of such publications are here reviewed.

The Federal government is today the major single employer of scientists and engineers and also furnishes financial support for about half of the research and development carried out by industry. The *Organization of the Federal Government for Scientific Activities* is described in a report of that title by the National Science Foundation, published in 1956.

Part I of the report, comprising about twelve pages, is devoted to a succinct discussion of the evolution of the Federal government's organization for science, accenting the impetus provided by three major wars—the Civil War, and World Wars I and II. Part II of the report details the general functions, funds, personnel, and facilities of the various Federal organizations involved. Its three hundred thirty-two pages provide a literal insight into the vast scope and complexity of Federal activity in this field.

Another report by the National Science Foundation of particular interest is the *Proceedings of a Conference on Research and Development and Its Impact on the Economy*. The conference was held in 1958, and this record of its proceedings contains many valu-

able and interesting papers. It is divided into four parts, the first two of which are industrially oriented and the last two concerned more with the economy as a whole. The papers are of a uniformly high quality, and range from a lively apologia for the statistically-reported low level of research and development in the construction industry, by George Cline Smith, to analyses of the interrelations of research and development with the growth, stability, and dynamics of the national economy, by Sumner H. Slichter, Charles J. Hitch, and James R. Killian. All the papers in this report have been thoughtfully prepared and have considerable depth and scope. They are recommended reading for anyone having a broad interest in the research and development field.

A different collection of worthwhile essays in this field is to be found in the January 1960 issue of *The Annals* of the American Academy of Political and Social Science. These are concerned with government and science and are grouped under three major headings: "Needs, Problems, Opportunities," "Administration of Government Science," and "Government Science and the Universities." As might be expected, there is some mention of the part which the social sciences might play had they more support and recognition, although this theme is apparent in only a few of the essays.

The articles included range over a wide variety of pertinent subject matter and are contributed by an equally wide variety of authors —including academicians, members of the Congress and government, and industrial executives. Of particular interest are: an article by Harold J. Barnett on the role of research and development in the process of economic transformation and national security; an allied article by Vincent Heath Whitney on science, government, and society; an article by John C. Weaver on the impact of federal support on the universities; and articles by Byron T. Shaw and Herbert H. Rosenberg delineating the experience of old (Department of Agriculture) and new (National Institutes of Health) government research agencies, respectively. This group of essays, when combined with the N.S.F. report described immediately above, provides a penetrating and many-sided view of our national research and development effort.

Congressional hearings provide a glimpse into the ways of a democracy in coping with its major problems, and are also often indicative of the limited degree to which our key government executives have control of their own time and working resources.

Parts I and II of the "Hearings on Research and Development" before the House Committee on Executive and Legislative Reorganization, during the second session of the 85th Congress, are quite instructive in these respects. The hearings reported in Part I were recorded in January and February of 1958 and are a wide-ranging series designed to develop background information for the subcommittee's use in their studies of the effectiveness and efficiency of our federal research and development activities. Part II of these hearings was recorded in July of 1958 and consists of testimony taken from various representatives of the military research and development complex.

There are a host of published congressional hearings which bear upon Federal activity in research and development—for example, those of the appropriations committees before which the various agencies must justify their need for research and development funds. However, the two above represent a special investigation of this particular field.

At the other extreme, from the general discussion represented by the Congressional hearing, is *The Scientist in American Industry* by Simon Marcson of the Industrial Relations Section of Princeton University. This report is based on an intensive two-year study of an industrial research laboratory concentrated on the working environment afforded the individual scientist. It centers around the organizational conflict between the "Executive Authority" exercised by the corporate managers and the "Colleague Authority" more natural to the individual professional scientist.

According to the study, the conflicting goals of the corporation and the professional scientist result in strain, on both the individual worker and the research laboratory management (which must represent the scientists to corporate management and corporate management to the scientists). The report recommends that the strain can be diminished for the individual scientist by greater use of "Colleague Authority"—but offers little in the way of relief for laboratory management.

Like so many studies of this type, small at-

tention is given to the fact that the primary purpose of the organization is to produce useful research results, and the "happiness" otherwise due its members—though perhaps ultimately more important—is a secondary consideration in this context. It seems likely that the scientist *is* most productive in a favorable working environment, but this relation has yet to be conclusively established. Certainly, some outstanding work in the past was done under conditions much less conducive than those in the laboratory described.

Scientists in Government, by Earl W. Lindveit is a survey, from the personnel specialist's viewpoint, of the policies and practices of the Federal government in obtaining and utilizing scientists and engineers. On the assumption that "the potential advancement of the nation will depend in large part upon the quality and numbers of scientific personnel in Federal employment," the author analyzes policy formulation, training and recruitment, research environment, and the retention of scientific and engineering personnel. He concludes that the Government has not yet been successful in devising a unified and effective policy to deal with its scientific manpower problems and may continue to be seriously hampered in competition for the highly skilled talent needed to carry out many important programs. The possibility thus arises of an increased reliance on the performance of Government research and development by contract.

The impact of contract research on the universities is thoughtfully and comprehensively examined in *American Universities and Federal Research* by Charles V. Kidd. This is an excellent treatment of a difficult and variegated subject. As the author states: "Universities need support for Science from Government and Government needs knowledge obtainable only by University Research. As a result, the two have been placed in a state of unprecedented mutual dependence." This has resulted in considerable benefits to both participants but has also created a large number of unresolved problems. Most of these are but part of a larger question, i.e., the proper relationships among science, education, and society.

Science and State Government by Frederic N. Cleaveland is a pioneering study of the scientific activities of state governments. Six states were studied in detail and this book is the resulting description and analysis of these activities in California, Connecticut, New Mexico, New York, North Carolina, and Wisconsin.

The annual expenditure on scientific activity varied from a little over $2 million in New Mexico to over $32 million in California. As a per cent of total state government expenditures, however, the scientific effort is more nearly constant—ranging from 1.2 per cent in New York to 2.0 in Wisconsin. The pattern of expenditure on scientific activity varies among the states. New York, for instance, spends 50 per cent more on health, education, and welfare than it does on agriculture while Wisconsin spends thirty times as much in the agricultural field as it does in health, education, and welfare. In all six states, the major emphasis was on research, which accounted for over 70 per cent of the total budget for scientific activity in each case. In five of the states, basic research accounted for more than one-third of the research budget. In all six states studied, research and other scientific activities are not organizationally treated as a separate function by the state governments, but are administered on a dispersed basis by the various departments.

In the plethora of studies and analyses of research, development, and scientific activity in the Federal government, in industry, and in the universities, the support, and carrying out, of these activities by state governments has been largely overlooked and the present volume is a welcome start on filling the resulting vacuum.

A very interesting comparative study has been made by Edward McCrensky of civil service handling of scientific personnel in several European countries, Great Britain, the United States, and the U.S.S.R. His book is entitled *Scientific Manpower in Europe,* and it provides a readable summary of the personnel practices followed in managing scientists and engineers by a variety of governments and government agencies. The reader will find therein a number of fruitful concepts for application to his own problems, particularly if he is forced to work within a civil service framework.

One very interesting fact brought out in the book, though not particularly germane to its purpose, is the extraordinarily high proportion (53 per cent) of female specialists em-

ployed in the national economy of the U.S.S.R. In 1955, 29 per cent of the engineers employed were women and 67 per cent of the teachers who were university graduates were women, as were 76 per cent of the medical doctors and 32 per cent of the jurists. Of the total students in higher educational institutions in the 1955-56 school year, 52 per cent were female. Perhaps the real enemy isn't communism after all.

Much of the material reviewed above reminds one of a remark attributed to some foreign wit during World War II. He said that he had listened interminably to talk of American "know-how," but had yet to hear one word about "know-what" or "know-why."

If there is one area in which we may be forgiven this sin, it is in research and development—for the "what" is often highly unpredictable and the "why" had better be settled before the effort is under way. Once the results of the effort begin to appear, they will produce major new situations which *must* be dealt with and cannot be ignored.

Our frequent lack of national concern with "what" questions and "why" questions is probably a by-product of what has been called the "benign chaos" of our democratic way of life which is designed to emphasize individual goals and aspirations perhaps more than national ones. At this point in history, however, we find ourselves in an enveloping competition with nations which are consciously using science and technology and research and development for the specific purpose of gaining world ascendancy of their system of economic and governmental organization. Communism would be little more than a word, were it not for the vigorous and dynamic science and technology which some of its practitioners have systematically developed. It is therefore clear that, if we are to preserve our way of life over the next few decades and perhaps even extend the benefits of its "benign chaos" to other peoples, we must equal or better the scientific and technological efforts of our competitors. And this must constitute a major part of the "why" of our effort in this direction for some time to come.

It is by no means clear, however, that the fundamental aspects of "why" (or even "if") have been objectively, rigorously, and exhaustively explored, and there is much fruitful work in this area for the philosophe.

In regard to the "what," it is apparent that military research and development must be kept at a productive pace at least sufficient to maintain the military strength needed for international negotiations of differences, and to deter open conflict.

It is also apparent that space exploration is an extremely important area which must be very heavily supported. There is more involved here than the advancement of knowledge and its conversion to practical use. Science and technology have given mankind, for the first time in history, a type of national effort which is large enough, exciting enough, and important enough in national prestige to absorb the energies, pride, and nationalism which have, in the past, often found their outlet in war. It may well be possible to develop the international race into space into a kind of enormous "game of peace," ultimately replacing the "game of war" in much the same fashion as baseball has sometimes been successfully substituted for head-hunting among (more) primitive peoples.

In the field of agriculture, the total amount of cropland under cultivation has remained essentially constant since 1920, despite the rapidly growing population. Nonetheless, farm production has risen by about 80 per cent from that time, while farm employment has diminished by almost 50 per cent. The advances in technology which made this possible have also produced a heavy burden of surpluses. Despite this situation, there is still a continuing need for expenditure on agricultural research, although it would appear offhand that it need not be drastically accelerated. On the other hand, more vigorous research by processing industries could provide a wider market for agricultural products and thus mitigate the "farm problem."

There seems little question as to the value of medical research, provided the program supported is soundly conceived, and there are a host of other areas of national importance in which the benefits of continuing research effort are of unquestioned value.

There is an acknowledged need for greater concentration on basic research, and some way must be found to make more rigorous and exact the social sciences in order that they can be lifted further out of the limbo in which they are struggling.

It is also clear that the increased emphasis on science in the educational field is desirable. Not only is this required to meet the in-

creasing demand for scientists and engineers but, perhaps more importantly, to develop a widespread understanding of the scientific and technological texture of the world in which we live. The scientific emphasis can be expected to become even more pronounced over the next few decades.

Where all of this is leading us, we can but hazard a guess, and the final judgment must be left to future generations, if any. We can, however, be relatively certain of a few things:

Mighty forces are being created in the accelerating total effort devoted to research and development throughout the world. Annual research and development expenditures in this country alone have been rising at a tremendous rate since 1940—when the sum stood at $350 million. By 1950, this total had risen to about $2½ billion. In 1960 it stood at about $12½ billion.

Barring an international catastrophe, the momentum of this effort is bound to be a powerful and pervasive influence in the next few decades, regardless of how well or poorly the effort is organized and how contented or malcontented its participants. In some of its aspects, the progress of science is not unlike that of a chain reaction, and we may have, in effect, created a nuclear explosion.

By its very nature much of this effort must necessarily be sponsored, managed, and (in many cases) performed by government agencies. Their proportion of the total is more likely to increase than to decrease. It is already greater than 50 per cent.

This places a huge burden of responsibility on government executives, engineers, and scientists—for their efforts, choices, and decisions will in very large measure shape the future.

Despite the increasing scale of the total effort, the quality of the personnel involved will continue to be of paramount importance. One brilliant idea can still offset millions of man-hours of plodding, systematic work or make obsolete millions of dollars worth of equipment.

Because of the increasing scale of the total effort and of individual projects, it will become ever more difficult to maintain the organizational freedom and flexibility to accommodate radical innovation. This could prove fatal.

Organization Theory and Public Administration: Bits and Pieces

By CHARLES A. JOINER, Michigan State University

COMPLEX ORGANIZATIONS: A SOCIOLOGICAL READER, by Amitai Etzioni. Holt, Rinehart, and Winston, 1961. Pp. 497. $6.75.

THE study of public administration has always been closely linked to organization theory. Even the works of Weber and *The Papers on the Science of Administration*[1] were based upon conceptions about how to structure and program the sociology and politics of administrative organization. The *Papers* represented an important integration of materials in organization theory available at that time. This integration included carefully articulated concepts developed in public administration, business administration, industrial sociology, and the then prominent school within political science of constitutionalism and responsibility. Unfortunately, however, the *Papers* did not integrate theoretical concepts concerning the politics of informal structure in organization nor did it incorporate concepts concerning the politics of nonmember contributions to organization operations. This particular failing is traced to the fact that both the sociology and the politics designed for administrative organizations by the *Papers* were built upon an economic theme that viewed contributors to organization operations as being purely economic men.

Since 1937 various efforts to develop organization theory have been based upon the concept that inducements given in exchange for contributions must be viewed in social and political terms as well as in economic terms.

[1] Edited by Luther Gulick and L. Urwick (Institute of Public Administration, Columbia University, 1937).

The sociology and politics of devising and allocating inducements both to organization members *per se* and to nonmember contributors have received increased attention. This, in turn, has led to increased concern with the problem of finding the form of organization structure which provides the greatest total positive inducements. Studies of the negative aspects of increasing bureaucratization, for instance, have been concerned with the total inducements offered by formalization of structure. These studies have analyzed the politics of informal organization as a reaction to the type of inducements presented by formalization. A recent article in this journal by Robert T. Golembiewki, "O & M and the Small Group," has emphasized this point as it directly applies to public administration. Concern with organization structure has also emphasized the inducements that particular structural forms offer to nonmember contributors. Philip Selznick's study of the TVA is the classic work on this aspect of the sociology and politics of administrative organization. In particular, the analysts of the political processes of policy formulation and organization structural adaptations have contributed to understanding of inducements to nonmember contributors. These analysts include the interest activity theorists such as Murray Edelman, the administrative responsibility theorists such as Arthur Maass, and the special substantive area theorists such as Charles Hardin.

Unfortunately, concepts relating to the politics and sociology of nonmember inducements have not been adequately integrated into contemporary organization theory. Even James G. March and Herbert A. Simon fail to develop models for analyzing this form of inducements in *Organizations*.[2] Yet study of voluntary associations, trade unions, and corporations has shown that forces in an organization's environment can be analyzed through use of concepts similar to those developed by Edelman, etc., for the study of governmental administrative organizations.

An integration of these concepts from different academic disciplines relating to the political and social aspects of nonmember inducements would greatly advance the development of organization theory. First, it would contribute to the development of a framework of concepts for describing inducements and the effects of specific inducements. Second, it would contribute to the development of a theory of political behavior in organizations. Third, it would make more meaningful the concept of an organization as an ongoing concern (a social system) whose operations involve a variety of types of contributors and contributions. Fourth, it would make possible the analysis and description of administrative policy formulation and structural reorganization in all forms of social organizations. Last, it would provide a theoretical framework for describing the sociology and politics of organization adaptations made to ease internal and external tensions.

The operations of administrative organizations must also be examined as political processes. They cannot be clearly understood apart from (a) the sociology of administrative organization, i.e., the processes of interaction, communication, and influence which define organization operating structure and (b) the politics of administrative organization, i.e., the processes of manipulating interaction, communication, and influence. Materials are available in the reports, theories, and models from numerous academic disciplines that have devoted attention to various forms of social organizations. The task of organization theorists is now to integrate these materials into meaningful concepts, theories, and models to describe the sociology and politics of all social organizations.

A Reader of Unintegrated Organization Theory Concepts

Amitai Etzioni's *Complex Organizations: A Sociological Reader* now joins other recent attempts to integrate materials available in several disciplines relating to the operations of social organizations. This work is one of the current rash of "readers" which reproduces in some logical fashion certain statements, theories, and studies of those who have contributed to increased understanding of certain social and political phenomena. Because it is a "reader," Etzioni's work cannot integrate the materials themselves. However, numerous forms of integrative techniques which are available were not exploited by Etzioni. For example, his seven brief topic introductions could have provided an integration of the concepts included in the essays. He could have de-

[2] John Wiley and Sons, 1958.

veloped an organization theory based upon those concepts through prose. However, his introductions are almost purely descriptive of the materials in individual essays rather than statements articulating the common elements surveyed. Generally speaking, his introductory essays are good descriptions but on occasion miss the main thesis presented, such as when he describes Blau's argument about bureaucratic behavior as a function of personality rather than of role. Etzioni also could have integrated his materials by constructing models or theories specifying the major concepts which the separate essays contributed toward making the models or theories applicable to the comparison of all forms of social organizations. He fails to provide such tools of integration.

Etzioni's failure to integrate somehow the concepts developed in the essays has made the contribution of his work much less than it potentially could have been. This is particularly true as a contribution useful to students of public administration, for several reasons. *Complex Organizations* is not a contribution to the development of a theory of politics which includes the operations and impact of contemporary forms of intermediate structures. It is not a contribution to the study of comparative administration because it does not provide operational definitions nor does it provide an integration of concepts relating to all types of organizations. Nor is it a contribution to a genuine organization theory because Etzioni makes no attempt to provide systematic linkage and integration of constructs which have been devised by students of numerous disciplines for the articulation of components of particular forms of organizations.

It is very unfortunate that Etzioni did not see fit to pull together the materials he uses either through development of a prose conceptual framework or through construction of models. A consolidation of tested hypotheses, empirically based generalizations, and theories claiming to have universally valid applicability is needed. Constructs covering individual-group-organization mutual dependence within all forms of social structure have not been developed in a manner beyond the classic constructs of Herbert A. Simon in his *Administrative Behavior*[3] or Chester I. Barnard in his *Functions of the Executive*.[4] March and Simon attempted to integrate findings of various disciplines and such articulate students of social organization as E. Wight Bakke, Chris Argyris, and Talcott Parsons, in certain of his contributions, have attempted to develop general constructs of the early Barnard and Simon variety. But, generally speaking, these attempts have fallen short of a unified theory of organization.

In order to integrate materials concerning organization variables and components, several steps are required. Concepts about variables and components need to be categorized and articulated. These variables and components should be those relating to such aspects of organization operations as social process and social product, direct and indirect operants, member and "constituency" participants, and formal and informal structure. Numerous disciplines have studied and analyzed these and many other such aspects. However, the only actual attempt to integrate available findings other than March and Simon has been the work of Pfiffner and Sherwood, *Administrative Organization*.[5] These two attempts at integration have greatly refined and even operationalized the early Barnard and Simon formulations.

It is, of course, very difficult to provide an integration of this type in a reader.

Yet it is possible to select very carefully not only works but passages from works that can be profitably integrated in a reader. But such a pulling together of materials is possible only by extremely careful and precise development of a conceptual framework to serve as the context for integration. This framework could take the form of definitively developed theory or it could take the form of a model. Arthur Rubenstein and Chadwick Haberstroh in *Some Theories of Organization*[6] attempted with some success to develop such a framework for their reader in organization theory. As a result their contribution is an important one because they have at least given the student of organization something more than he previously had. But it is not an easy matter to construct models concerning the exact words of another author. Some interpolation is essential. The interpolation by March and

[3] Macmillan, 1957.

[4] Harvard University Press, 1938.

[5] Prentice-Hall, 1960.

[6] Dorsey Press, 1960.

Simon of a vast amount of multi-disciplinary materials is an example of what can be done in the way of construction of models of this type. However, their attempt was more one of explanation of meaning than of integration. Nonetheless, the importance of explication as a foundation for integration cannot be overestimated. A prime example of this, which was published long enough ago to give some idea of the impact this type of endeavor has upon organization theory, is George C. Homans' *The Human Group*.[7] In this work, individual studies about informal organization variables are thoroughly covered within a clearly defined conceptual framework. The impact of Homans' new work, *Social Behavior: Its Elementary Forms*,[8] in which his conceptual framework is even more clearly defined should be even greater than that of *The Human Group*. In each instance—March and Simon, Pfiffner and Sherwood, Rubenstein and Haberstroh, and Homans—the materials utilized were not original. Rather, they applied the techniques and tools of their profession to the clarification, articulation, and conceptualization of many of the most important studies, theories, and models in organization theory. They did not integrate all of the findings concerning each of the aspects of organization operations. But they have provided a conceptual framework and a series of models which, if properly exploited, can lead to the much needed integration. In other words, they have provided the type of contribution to better understanding organization behavior which Etzioni simply does not provide.

Organization—Definitions, Implications, Goals, Structures, and Changes

The criticisms of Etzioni's failure to provide any integration are serious but in general they do not apply to the selection of essays included in his work. He has included many excellent selections and five original essays that are definite contributions. His first topic "Toward a Theory of Organization" includes well-known statements by Weber, Barnard, Selznick, Parsons, Merton, March and Simon, and Gouldner. However, because he does not analyze the various diverse definitions given for "organization" and does not specify components common to all of the definitions, Etzioni lessens the value the essays have in the context of his work. Barnard, Selznick, and Parsons see organization as a social system, Merton sees it as an activity functionally related to purpose, and March and Simon define it in terms of component contributors and inducement systems. "System" is the common element in these definitions. Yet Gouldner questions the system definition as well as some of the definitions provided in the other essays; he especially questions the structural-functional "needs-security" theme of Selznick and the bureaucratization theme of Weber. Gouldner's questions are penetrating, although they can be answered within the Barnard, Selznick, etc., framework. By making no attempt to answer Gouldner's questions, Etzioni presents an interesting but confusing story to his audience.

Gouldner is also raising serious questions concerning the social and political implications of organization theory. Such implications are particularly important for Etzioni's topic "Organization and Society." But in this topic, Etzioni selects essays of a purely broad-gauge sociological nature. His selections here are excellent in themselves but, in general, are not relevant for his text. He changes his discussion from organization to bureaucracy without defining the latter. "The most powerful social units which make up modern society are bureaucracies" (p. 257). Lipset's fine essay, for example, is not related to organizations *per se*, or even to the bureaucratization of organization structure, but rather is a description of the problem of a potential clash between social and economic values of civil service systems and governing politicians. However, certain of the essays, especially the Eisenstadt and Dubin essays, in this topic implicitly outline political and social implications of organization operations even though their meaning is not drawn by Etzioni. In addition, many implications currently receiving attention by social organization students in several disciplines are not brought out in the text, e.g., the impact of organization membership upon member societal and political activity, the importance of voluntary associations in community policy formulation, the impact of corporations and unions (considered as organizations) upon community life-style, and the importance of organizations in the community power structure.

In his text the topics that most clearly ar-

[7] Harcourt, Brace, 1950.
[8] Harcourt, Brace, and World, 1961.

ticulate concepts in organization theory are those on organization structures, goals, and changes. In these topics, the dynamic nature of organization operations is emphasized, and the necessity and problems of providing inducements to both member and nonmember contributors receive attention. The essays are excellent and, if utilized properly, actually provide the basis for construction of an integrated organization theory. The basic thesis in these topics is that structure and goals can be adapted in operations and that the right adaptations can insure continued contributions from both members and nonmembers. Most of the selections are classic descriptions of this theme, e.g., Dalton, Sills, Clark, Thompson and McEwen, Blau, and Selznick. Original essays by Bernard Levenson, and by Allen H. Barton and Bo Anderson add to the presentation of the theme. Etzioni does not outline the importance of adjustment and adaptation but rather speaks of change from one equilibrium state to another. However, he does not articulate what he means by "equilibrium." This is very unfortunate, especially for the student of public administration, because the basic theme involves the political process of organization operations and changes. The theme could have been improved if Etzioni had brought out the role of member and nonmember interest activity as a force in organization policy formulation. Any of a large number of case studies could have been reproduced which would have provided the basis for a comparative study of government administrative organizations with other types of organizations such as corporations. The concepts that have been developed regarding the politics of change in organization structure and goals could have contributed to an integrated organization theory for comparative study.

Methodological Integration: A Basis for Integrating Organization Theory Concepts

Etzioni's last topic, "Methods for the Study of Organization," is the most original and in many ways the most stimulating in his work. The original essays by Lazarsfeld and Mendel and by Zeldich and Hopkins are excellent groundbreaking statements. And the selection by Weiss and Jacobson remains one of the most interesting statements in the literature on organization research. Etzioni correctly states the case for improved and integrated methodology:

> The issues are basically these: to learn to apply to the study of organizations methods which served fruitfully in the exploration of other fields; to adapt techniques which were developed specifically for the study of other subjects as, for instance, small groups to the study of organizations; and to establish research methods which will answer the special needs of the field, which are generated by the "emergent properties" of this type of social unit. (p. 419)

Methodology is an area where a great deal of success has been achieved. All social science disciplines have greatly refined their tools of investigation in the past few years. More and more variables are being included in single observation; more adequate statistical techniques for analyzing data are being developed; and, use of automatic data processing is becoming more widespread. What has been found in terms of improvements in tools of investigation is readily adaptable to study of administrative organization operations.

Information and techniques for gathering information relating to such primary social entities as small groups frequently can be adapted for study of intermediate structures such as administrative organizations. Of course, in many instances the rigor methodologically possible at the small group level is not possible at the organization level. Obviously, there are practical limits to the sophistication of the study of uncontrolled operations not present in the laboratory situation. The Zeldich and Hopkins essay in Etzioni's work outlines how organizations can be viewed as laboratory situations. Several points must be made in favor of adapting tested and proven methodological techniques for study of administrative organization: (1) adaptation of such techniques helps refine existing techniques for organization study; (2) adaptation of such techniques can aid in developing operational definitions of organization variables; (3) adaptation of such techniques provides the opportunity also to adapt a conceptual framework found useful at another level of analysis; and (4) adaptation of such techniques, if successful, aids in development of a conceptual framework of organization analysis in its own right. Numerous examples can be given of techniques that have been success-

Simon of a vast amount of multi-disciplinary materials is an example of what can be done in the way of construction of models of this type. However, their attempt was more one of explanation of meaning than of integration. Nonetheless, the importance of explication as a foundation for integration cannot be overestimated. A prime example of this, which was published long enough ago to give some idea of the impact this type of endeavor has upon organization theory, is George C. Homans' *The Human Group.*[7] In this work, individual studies about informal organization variables are thoroughly covered within a clearly defined conceptual framework. The impact of Homans' new work, *Social Behavior: Its Elementary Forms,*[8] in which his conceptual framework is even more clearly defined should be even greater than that of *The Human Group.* In each instance—March and Simon, Pfiffner and Sherwood, Rubenstein and Haberstroh, and Homans—the materials utilized were not original. Rather, they applied the techniques and tools of their profession to the clarification, articulation, and conceptualization of many of the most important studies, theories, and models in organization theory. They did not integrate all of the findings concerning each of the aspects of organization operations. But they have provided a conceptual framework and a series of models which, if properly exploited, can lead to the much needed integration. In other words, they have provided the type of contribution to better understanding organization behavior which Etzioni simply does not provide.

Organization—Definitions, Implications, Goals, Structures, and Changes

The criticisms of Etzioni's failure to provide any integration are serious but in general they do not apply to the selection of essays included in his work. He has included many excellent selections and five original essays that are definite contributions. His first topic "Toward a Theory of Organization" includes well-known statements by Weber, Barnard, Selznick, Parsons, Merton, March and Simon, and Gouldner. However, because he does not analyze the various diverse definitions given for "organization" and does not specify components common to all of the definitions, Etzioni lessens the value the essays have in the context of his work. Barnard, Selznick, and Parsons see organization as a social system, Merton sees it as an activity functionally related to purpose, and March and Simon define it in terms of component contributors and inducement systems. "System" is the common element in these definitions. Yet Gouldner questions the system definition as well as some of the definitions provided in the other essays; he especially questions the structural-functional "needs-security" theme of Selznick and the bureaucratization theme of Weber. Gouldner's questions are penetrating, although they can be answered within the Barnard, Selznick, etc., framework. By making no attempt to answer Gouldner's questions, Etzioni presents an interesting but confusing story to his audience.

Gouldner is also raising serious questions concerning the social and political implications of organization theory. Such implications are particularly important for Etzioni's topic "Organization and Society." But in this topic, Etzioni selects essays of a purely broad-gauge sociological nature. His selections here are excellent in themselves but, in general, are not relevant for his text. He changes his discussion from organization to bureaucracy without defining the latter. "The most powerful social units which make up modern society are bureaucracies" (p. 257). Lipset's fine essay, for example, is not related to organizations *per se,* or even to the bureaucratization of organization structure, but rather is a description of the problem of a potential clash between social and economic values of civil service systems and governing politicians. However, certain of the essays, especially the Eisenstadt and Dubin essays, in this topic implicitly outline political and social implications of organization operations even though their meaning is not drawn by Etzioni. In addition, many implications currently receiving attention by social organization students in several disciplines are not brought out in the text, e.g., the impact of organization membership upon member societal and political activity, the importance of voluntary associations in community policy formulation, the impact of corporations and unions (considered as organizations) upon community life-style, and the importance of organizations in the community power structure.

In his text the topics that most clearly ar-

[7] Harcourt, Brace, 1950.
[8] Harcourt, Brace, and World, 1961.

ticulate concepts in organization theory are those on organization structures, goals, and changes. In these topics, the dynamic nature of organization operations is emphasized, and the necessity and problems of providing inducements to both member and nonmember contributors receive attention. The essays are excellent and, if utilized properly, actually provide the basis for construction of an integrated organization theory. The basic thesis in these topics is that structure and goals can be adapted in operations and that the right adaptations can insure continued contributions from both members and nonmembers. Most of the selections are classic descriptions of this theme, e.g., Dalton, Sills, Clark, Thompson and McEwen, Blau, and Selznick. Original essays by Bernard Levenson, and by Allen H. Barton and Bo Anderson add to the presentation of the theme. Etzioni does not outline the importance of adjustment and adaptation but rather speaks of change from one equilibrium state to another. However, he does not articulate what he means by "equilibrium." This is very unfortunate, especially for the student of public administration, because the basic theme involves the political process of organization operations and changes. The theme could have been improved if Etzioni had brought out the role of member and nonmember interest activity as a force in organization policy formulation. Any of a large number of case studies could have been reproduced which would have provided the basis for a comparative study of government administrative organizations with other types of organizations such as corporations. The concepts that have been developed regarding the politics of change in organization structure and goals could have contributed to an integrated organization theory for comparative study.

Methodological Integration: A Basis for Integrating Organization Theory Concepts

Etzioni's last topic, "Methods for the Study of Organization," is the most original and in many ways the most stimulating in his work. The original essays by Lazarsfeld and Mendel and by Zeldich and Hopkins are excellent groundbreaking statements. And the selection by Weiss and Jacobson remains one of the most interesting statements in the literature on organization research. Etzioni correctly states the case for improved and integrated methodology:

> The issues are basically these: to learn to apply to the study of organizations methods which served fruitfully in the exploration of other fields; to adapt techniques which were developed specifically for the study of other subjects as, for instance, small groups to the study of organizations; and to establish research methods which will answer the special needs of the field, which are generated by the "emergent properties" of this type of social unit. (p. 419)

Methodology is an area where a great deal of success has been achieved. All social science disciplines have greatly refined their tools of investigation in the past few years. More and more variables are being included in single observation; more adequate statistical techniques for analyzing data are being developed; and, use of automatic data processing is becoming more widespread. What has been found in terms of improvements in tools of investigation is readily adaptable to study of administrative organization operations.

Information and techniques for gathering information relating to such primary social entities as small groups frequently can be adapted for study of intermediate structures such as administrative organizations. Of course, in many instances the rigor methodologically possible at the small group level is not possible at the organization level. Obviously, there are practical limits to the sophistication of the study of uncontrolled operations not present in the laboratory situation. The Zeldich and Hopkins essay in Etzioni's work outlines how organizations can be viewed as laboratory situations. Several points must be made in favor of adapting tested and proven methodological techniques for study of administrative organization: (1) adaptation of such techniques helps refine existing techniques for organization study; (2) adaptation of such techniques can aid in developing operational definitions of organization variables; (3) adaptation of such techniques provides the opportunity also to adapt a conceptual framework found useful at another level of analysis; and (4) adaptation of such techniques, if successful, aids in development of a conceptual framework of organization analysis in its own right. Numerous examples can be given of techniques that have been success-

fully adapted. Etzioni gives examples in the essays in his topic on methodology. Many other potential techniques are available for adaptation. In fact, better examples of possible adaptations, and also of integration of several techniques, than those given by Etzioni are given in *Modern Organization Theory*[9] edited by Mason Haire. A good beginning has been made in this area. The future possibility of developing an integrated organization theory including the politics and sociology of both member and nonmember contributions depends chiefly upon further advances in methodological adaptation and integration.

Politics—Sociology: The Mutual Bases of Organization Theory

For public administration the need for an integrated organization theory is expressed in the necessity for development of a theory to explain both the politics and the sociology of administrative organization operations. Such a theory must include the concepts that have been developed relating to inducements for both member and nonmember contributors. Etzioni cannot be blamed for failing to develop an organization theory incorporating all of the concepts relating to the political aspect of such inducements. As an industrial sociologist his charge was to integrate concepts relating to the sociological phase. If he had integrated the sociological concepts, however, he inevitably would have had to articulate and integrate certain political concepts. The two sets of concepts—political and sociological—cannot be kept separate.[10] They are two sides of the same coin. A rigorous, empirical investigation of organization operations will uncover not only processes of interaction, communication, and influence, but also the manipulation of those processes. A theory concerning the operations of all forms of organizations simply expresses this empirical finding in generally applicable terms. The increasing body of literature attempting to develop an integrated organization theory based upon investigations and concepts of varied disciplines is making the mutual dependence of politics and sociology more obvious than ever.

[9] John Wiley and Sons, 1959.

[10] Charles A. Joiner, "Administrative Organization as a Social System" (unpublished Ph.D. dissertation, Department of Political Science, University of Illinois, 1958).

The Point of Balance

The central theme of this paper may be summarized in four general propositions. The first is that, in government, there are certain powerful forces which favor the *status quo*. The second is that there are, at the same time, certain powerful forces which are conducive to change. The third is that under normal conditions these two sets of forces tend to balance each other in such fashion as to produce a state of substantial equilibrium, so that not much happens that is very significant. The fourth is that the role of the executive/administrator is important and sometimes crucial in determining which of the two sets of forces shall enjoy the advantage: that is, whether the course of public affairs shall be influenced more by the one or by the other. The upshot of the argument is that conditions normally are such that the executive/administrator is in a position to infiuence, and sometimes to determine, whether the course of government (or of that segment or part of government for which a particular executive/administrator may be responsible) is to be characteried by resistance to change or by dynamism, by adherence to tradition or by a spirit of innovation, by sobriety or by daring.

—Roscoe C. Martin, "Administrator's Role in Interjurisdictional and Interagency Relations," in *Guidelines for Administrative Action* (Division of Government Research, University of New Mexico, 1958).

Developments in Public Administration

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Automatic Data Processing—Dr. Jekyll or Mr. Hyde

In 1951 the first large-scale, fully automatic business data processing system was delivered to a federal government agency, the Bureau of the Census. By 1957 a total of 121 electronic systems had been installed for business and related uses in the federal government with an annual rental cost of over $20 million plus purchase costs of over $9 million. On June 5, 1959 Ellsworth H. Morse, Jr., Director, Accounting and Auditing Policy Staff, General Accounting Office, reported to the Subcommittee on Census and Government Statistics of the House Committee on Post Office and Civil Service that he estimated that over 175 systems had been installed with annual rental costs of about $50 million. (Hearing before the Subcommittee of the House Committee on Post Office and Civil Service, *Use of Electronic Data-Processing Equipment,* June 5, 1959.)

A later report of a different subcommittee of the House Committee on Post Office and Civil Service put the total in different terms. The report stated that on June 30, 1960 "the Government had at its disposal 524 electronic computers exclusive of those for tactical and classified uses in the Department of Defense. . . . The Department of Defense controls 364 computers, approximately 70 per cent of the total. The Atomic Energy Commission uses 52 computers, accounting for 10 per cent. Another 12 per cent is found in the combined holdings of the Department of Commerce, the National Aeronautics and Space Administration, the Federal Aviation Agency, and the Post Office Department. The remaining computers are widely distributed among other Federal departments and agencies." (Subcommittee on Census and Government Statistics of the House Committee on Post Office and Civil Service, *Report on the Use of Electronic Data-Processing Equipment in the Federal Government,* August 31, 1960, p. 61.)

The state and local government side hasn't any comprehensive statistics to give conclusive evidence of the extent to which automatic data processing has applied there, but a recent article in the *Review* reported "130 computers in place in all state and local government jurisdictions in the United States." (Harry Fite, "Administrative Evolution in ADP in State Government," 21 *Public Administration Review* 2 (Winter 1961).) Obviously their use is extensive at this level. Maurice F. Ronayne reports use of computers by Iowa, Massachusetts, and Pennsylvania and indicates that Michigan and New York are moving in that direction. He also reports use by such varied jurisdictions as the Port of New York Authority, New York City, Baltimore, St. Louis, Glendale (California), Portland (Maine), and Wichita (Kansas). ("The Personnel Side of Automatic Data Processing," 21 *Public Personnel Review* 243-48 (October 1960).)

Further indication of the extent of the invasion of automatic data processing into local government is presented by two special bulletins of the Municipal Finance Officers Association, discussing such topics as "Opportunities for Systems Mechanization," "Detroit's Experience with Electronic Data Processing," "Feasibility of Using Electronic Data Processing—An Administrative Tool." (*Electronic Data Processing for Governments* (Special Bulletin 1959B, December 1, 1959) and *Applications of Electronic Data Processing* (Special Bulletin 1960D, September 1, 1960).)

Revolution in Process

There can no longer be any doubt that there is a revolution in process where auto-

matic data processing is invading the kingdom of the bureaucrat—the office—and is attacking the instrument of the bureaucrat—records and paperwork. If Chester I. Barnard was correct in saying that organizations alternate in attacking the problems that face them, then it is natural that the automatic data processing revolution should occur at this time, since records and paperwork have become one of major limiting factors in organization operation. *Item:* In 1956 for the first time in history white-collar workers exceeded blue-collar workers. *Item:* The proportion of employees in clerical jobs was 1 in 20 in 1910, 1 in 8 in 1950, 1 in 7 in 1960, and now includes more than 9.6 million persons.

The question is no longer whether there will be a revolution but, rather, what can be done to control its negative effects and enhance its positive effects. Even scant attention to the literature leaves one with the impression that many persons in public administration do not yet appreciate the implications of the revolution in process and appear to consider computers as glorified adding machines. One is left with the impression that the revolution will proceed under its own power—unlimited, unchecked, and with few plans prepared.

One broad criticism of the revolution in process recently appeared in the *Harvard Business Review*, based on a two-year study in the San Francisco Bay Area of nineteen organizations, including large and small private business concerns and a few government agencies, that had introduced ADP into their offices. The author's major indictments are worth examining in the light of other evidence available on some of the results of the revolution in process. (Ida Russakoff Hoos, "When the Computer Takes Over the Office," 38 *Harvard Business Review* 102-112 (July/August 1960).)

Job Loss and Change Under ADP

Indictment: Miss Hoos' first criticism is that not only are jobs being lost in the changeover to ADP but that, even in cases where persons are displaced to new jobs, these jobs are more repetitious, simple, monotonous, and poorly paid, and have fewer promotional opportunities.

Mann and Williams' study of the changeover to ADP in a private company selling electric light and power offers evidence to support the indictment. (Floyd C. Mann and Lawrence K. Williams, "Dynamics of a Change to Electronic Data-Processing Equipment," 5 *Administrative Science* Quarterly 217-56 (September 1960).) It is important to remember here that this firm is "well known for its development of new management ideas, especially in the area of 'participative management'." (p. 219)

Mann and Williams found that planning, communication, and clear policies on personnel matters, combined with an established credit of good relations with their employees, eased the morale problems of the transition. The announced personnel policy included the promise of job security through freezing new hiring, internal transfers, training for new jobs, and no downgrading. Also, all new jobs assigned during the two-year period of the transition were considered as temporary. Evidently in this case study there were not enough job losses worth noting. However, it seems clear from the text that the elimination of the dull repetitive job and the general upgrading of work often promised by proponents of ADP did not occur. The authors indicate that "the least interesting and most menial types of jobs had been eliminated, but so had a number of high-level nonsupervisory jobs." (p. 247)

Mann and Williams also note that in "accounting, the greater number of key punch operators and other machine groups increased the number of employees associated more with the mechanical processing of the data than with the data itself." (p. 253) They also indicate another important factor associated with the increase in machine-type operations when they say "such changes allowed the development of tighter standards of performance, and the increasing costs of errors augmented concern for standards." (p. 254) Thus it would seem that Miss Hoos is supported in her view that "the simplification and routinization of office tasks which accompany EDP have provided further incentive for applying production-room thinking to office operation."

A study published by the U.S. Department of Labor offers a little more evidence on the indictment. The report is based on information collected from some twenty private business offices that had installed large-scale electronic data processing equipment for business purposes. The portion pertinent to the ques-

tion under examination here is the extent of reassignment, upgrading, and downgrading of personnel in these offices. (*Adjustments to the Introduction of Office Automation*, Bulletin No. 1276, May 1960).

First, in total employment the report indicates that while office employment continued to increase in these offices after ADP had been installed, it increased at about one-half the rate of general employment of all clerical and kindred workers during this period (1953-57), as shown by the U.S. Bureau of Census estimates for the country. The study concludes that ADP reduced the rate of increase in the demand for clerical employees, especially for routine work, and goes on to state that several offices reported "the need for overtime data processing had been reduced, hiring cutback, and part-time employment curtailed." (p. 37)

Second, within the offices following installation of ADP, the report indicates that one-third of the 2,800 employees involved had been reassigned and of those who remained with the firms during the eighteen months, a little over two-thirds were in positions classified at the same grade, nearly a third had been promoted to a higher grade, and only about 1 per cent had been downgraded. One year after installation most employees were doing the same kind of work, while about 16 per cent were doing a different kind of work. Only 2 per cent—about fifty-two—were transferred to ADP occupations, and most of them had previously been in administrative and accounting and professional work.

Few employees from routine clerical fields were assigned to the new types of work. About 15 per cent or 416 of the 2,800 employees had left the firms.

ADP Job Displacement in the Federal Government

Evidence from instances of installation of ADP in Government is harder to come by, but hearings before the Subcommittee on Census and Government Statistics offer a little information on some of the major instances where ADP has been applied in the federal government. In a prepared statement to the Subcommittee, Edward R. Silberman, Assistant Administrator for Personnel, Veterans Administration, states that as a result of the installation of a large-scale computer in that organization beginning in 1959 the VA would save 312 positions by the end of FY 1960 and 1,259 positions by the end of FY 1962. He indicated that a turnover rate of 22 per cent, a job freeze in the agency, and retraining and reassignment would take care of most of the displaced personnel. He also indicated that every effort would be made to place individual employees not taken care of by those methods in other federal agencies and in private employment. Silberman told the Subcommittee that the ADP change had caused no RIF in the VA. (Hearings before the Subcommittee on Census and Government Statistics of the Committee on Post Office and Civil Service, *Office Automation and Employee Job Security*, March 2 and 4, 1960.)

Essentially the same story was told by the representatives of the Post Office Department, reporting on automation in postal operations, and the Treasury Department, reporting on an installation that integrated certain phases of operations formerly performed in the GAO, the Federal Reserve Banks, and the Treasury. The VA installation is also noteworthy in integrating some of its operations with the Treasury and Post Office Departments.

Representatives of several employee organizations also testified and it is interesting that their testimony indicated that they were satisfied with the job security aspects of the changeover to ADP in these federal agencies. Several praised the agencies, especially the VA, for the methods they employed to ease the transition for the federal employees involved.

At one point James Campbell, President, American Federation of Government Employees, in discussing the problem of displacement, said, "We have no complaint at this time. We have received very few complaints from our members in regard to the displacement of personnel. We have an occasional complaint. . . . Except for that . . ., we have felt that by and large the agencies have made a reasonable effort to take care of the displacement of personnel, in connection with the installation of this machinery or equipment." (p. 7)

Source Data Writing

One additional bit of evidence is crucial because it refers to one of the major occupations that are helping to take up those individuals who are displaced by ADP. Normally a considerable number of clerical employees who are displaced are shifted to preparing the

input for the computer through key punching or other similar operations. This converting of basic data to a form the computer can handle is one of the high-cost parts of the computer operation and is the subject of intensive research by computer manufacturers. "One reason the computer has not lived up to all its glamorous promise," says an article in *Armed Forces Management,* "is that the tremendous volumes of variable data it handles must first be converted into the computer's language—a process often as costly as the system itself." The article goes on to point out that the computer industry is concentrating on this problem and has already come up with some partial solutions. Once the problem is solved, the probability of job loss will be much greater. ("Source Data Writing: The Computer Bottleneck," 6 *Armed Forces Management* 38-39 (July 1960).)

Termites in the Foundation

Indictment: According to Miss Hoos, "Not only are the conventional pyramids tottering, with new hierarchical patterns emerging, but certain traditional concepts of the role of top and middle management are changing." (p. 107) And, she continues, the need to exploit effectively the high priced equipment and the ability to centrally control operations previously decentralized because central control was impossible has caused a reversal of the trend toward decentralization and placed a premium on planning.

Researcher Hoos found, for example, that in the organizations she examined, the duties of middle management had changed. Previously, those duties, though largely routine, were considered training experience for policy-making jobs, but with the advent of the computer these duties became largely "monitoring for errors before information reaches the EDP machine, and handling those exceptions not covered by the program." (p. 107) The opportunities for the exercise of initiative or judgment and the prestige of the jobs are being reduced, and the value of these jobs as training grounds for top management is declining. As a result, she found instances where middle management people with the best potential for top management were leaving to find more challenging jobs.

Careful reading of the Mann and Williams study indicates that this pattern was also going on within the changing organization they were studying. They say that a "change-over to EDP appears to accelerate the level of formalization within an organization. The organization of work is further rationalized; rules and regulations are substituted for individual decision making. Programming itself is a large step in this direction. Decisions formerly left to individual employees to handle within the spirit of a general statement of policy are programmed into the machine. It is this type of decision with known criteria that can be built most readily into machine programs. With the programming of this area of decision making, important functions and even certain positions within the organization are eliminated. Previously these functions have supported a job occupant's claim to a title and a grade of some status within the system. Such positions are typically perceived as status positions, serving as terminal points for the average employee who rises to these positions through sheer endurance within the system. Occasionally these positions also serve as a proving ground for managerial aspirants." (p. 251)

Melvin Anshen, in an article in the *Harvard Business Review,* comes to a different conclusion when he states that the "tasks of middle management will resemble more closely, not less closely, the tasks traditionally associated with top management. Because of heightened concern with problem identification, decision implementation, and new implementation, and new opportunities to find solutions, middle managers will be top managers in miniature. They will have more occasions to exhibit their capacities, build on experience, and qualify for advancement." ("The Manager and the Black Box," 38 *Harvard Business Review* 54 (November-December 1960).)

Pfiffner and Sherwood in their recent book seem to support Miss Hoos' contention that middle management will be hard hit by the ADP revolution when they say: "It has been suggested by Leavitt and Whisler (Harold J. Leavitt and Thomas L. Whisler, "Management in the 1980's," 36 *Harvard Business Review* 41-48 (November-December 1958))—and there is mounting evidence to support the contention—that the mechanical "brain" is hitting hardest at the middle management level. The line supervisors still have to deal with their subordinates, though there may be

fewer of them. The top managers still have basic policy decisions. But it is in terms of the operating decisions formerly made by middle management that the impact of electronic mechanization is most being felt." (John M. Pfiffner and Frank P. Sherwood, *Administrative Organization* (Prentice-Hall, 1960), p. 456.)

To Centralize or Not To Centralize

The question of centralization-decentralization as a source of argument and discussion in management circles has been a hardy perennial. Is the present fear of recentralization just one more resuscitation of that old argument? It is hard to say for certain at this point because prediction of the future is involved, and so much evidence is being given for both sides. However, recent statements and articles furnish food for thought because they open the door on some advanced thinking in the area of "systems" and "IDP," another set of initials which refers to integrated data processing, and give us stronger indications that what has occurred thus far in ADP is only the beginning of the revolution.

Howard Coughlin, President, Office Employees International Union, AFL-CIO, provides some warning that the revolution is just beginning and of the future effects of ADP on job displacement in a written statement to the Subcommittee on Automation and Energy Resources of the Joint Economic Committee of Congress: "Usually where an installation took place, it was to perform a specific operation. The computer was sold on this basis and was programed for this operation. It has been discovered that the computer can do many more jobs in an office than that for which it was originally purchased or planned. Many concerns have hired their own programers to get the maximum out of computer time. This is being done with little or no increase in machine investment. Here lies the greatest danger to the present jobs of most office personnel. The new machine jobs have been filled. The new operation will call for no increase in personnel. There is no longer an acute shortage in non-automated departments. What will happen to these workers? It seems evident as the programers catch up with their machines' capabilities, and the machines compute faster and faster, leaving more time for new operations, more and more jobs will be sacrificed with no increase in the operating complement." (Subcommittee on Automation and Energy Resources, Joint Economic Committee, *New Views on Automation,* 1960, p. 511.)

A more meaty statement was made last year by John A. Beckett, Assistant Director of the Bureau of the Budget, in a speech before a symposium on integrated and automatic data processing systems of the Federal Government Accountants Association. He first discussed some aspects of intra- and inter-agency IDP, praising what attempts had been made and indicating that more effort toward IDP was necessary. Then he looked ahead a bit and listed some items that must be considered in the future. In his fifth item he says, "as we in the Government move ahead in the ADP program, one very necessary ingredient must be present . . . in ADP it is indispensable. I'm talking about common purpose, coordination, cooperation, or teamwork. When ADP equipment is being considered in any one of our departments—indeed, in some of our large bureaus and local installations—and certainly in the Government as a whole, organizational lines, functional lines, geographical lines, and even professional lines, which have presented barriers to efficient data processing systems in the past, no longer can be permitted to be barriers to effective data processing. If we pursue the broad systems approach, as we must; if we actually integrate data processing systems, which is inevitable; if we coordinate and integrate systems on an interagency basis as we have already begun to do; then compartmentalization will have to stand aside, artificial boundary lines will have to disappear and experts in science, engineering, finance, accounting, logistics, personnel, management analysis, and many other functional or professional fields will find that the only course to follow is one which involves a common effort." (Appendix C, p. 112, of the earlier listed *Report on the Use of Electronic Data-Processing Equipment in the Federal Government,* August 31, 1960.)

An article by two men engaged in systems research in private industry, D. G. Malcolm and A. J. Rowe, gives us a peek at what they envision for the future and, more than that, what they are actually working toward. The article discusses the idea of computer-based management control systems where "a management control system is described as a set of

policies, procedures, and associated information processing designed to give direction to corporate activities in the following ways: by clearly establishing goals; by measuring progress in achieving these goals; by indicating the need for corrective action." In their view the current applications of electronic computers does not tap one-tenth of their ultimate potential and what they are after is the essence of the systems design process, the answer to the question, "What is the best system?" ("An Approach to Computer-Based Management Control Systems," 3 *California Management Review* 4-15 (Spring 1961).)

Malcolm and Rowe's approach to achieving this goal of the "one best system," to paraphrase an earlier scientific management man, is to attempt to construct improved models of the organization's over-all information flow through the systems analysis approach so that responses to specific changes in the simulated system can be studied. If the model describes the behavior of the elements of the system in a realistic manner, then what is learned can be applied to the real system. Presumably, although it isn't quite clear from what the authors say, computers could be applied to the system itself, permitting "on-line control" where data are read directly in and out of an integrated computer system, "management-by-exception" where exceptions to built-in criteria are output for management decision, and "interrogation, or fast-simulation" where management can ask, "What would happen if I make this decision?" and get an answer.

An earlier (1958) report of the General Accounting Office also gives some indications of the future of ADP and its relation to management control. "Electronic systems," the GAO says, "are causing evolutionary changes in management-control methods through development of management-by-exception techniques, and through the consolidation of related data in integrated management-analysis reports. These changes are discernible in the various stages of systems development presently underway, particularly in the supply and logistics system. . . . It is significant that, beginning with the application of automatic data processing to the inventory-control operations of the supply and logistics programs, there has been a gradual expansion of electronic systems into almost every functional area in the supply complex, i.e., program planning, budgeting, accounting, reporting, and other related processes. However, most of the present application efforts are limited in that they involve the design of systems to solve specific data-processing tasks for segments of over-all supply management programs. . . ." ("A Special Report to the Congress of the United States—Survey of Progress and Trend of Development and Use of Automatic Data Processing in Business and Management Control Systems of the Federal Government as of December 1957" in *Use of Electronic Data-Processing Equipment*, June 5, 1959, pp. 51-52.)

The GAO report then goes on to point out some trends that their investigation discerned: more centralized processing of data; consolidation of related data previously contained in a series of reports into a consolidated report; consolidation of related files into one file; preparation of more meaningful management-analysis reports; development of needed management reports which were not feasible under conventional systems; and, reduction in the time cycle required for the processing of data and report preparation. They conclude that it "is possible that these trends of development when properly controlled and exploited will play a significant part toward the establishment of major improvements in the management-control systems of the Government."

Does Centralization Follow Integration?

It is obvious that what is being considered is an integration of the information systems of modern organizations—private and governmental. Does it follow that this integration of information systems is accompanied by centralization of other aspects of organization operation? There is considerable disagreement on this point. Malcolm and Rowe duck this point by saying that, while decentralization leads to the possibility of distortion in information due to the number of levels through which the information must pass, this means only that the model builders must consider this fact. Pfiffner and Sherwood say that the revolution in information systems does not mean that either centralization or decentralization need follow.

Mann and Williams' study of the transition to ADP in the light and power firm offers some empirical evidence of what happens. "Greater interdependence," they say, "also resulted in

greater vulnerability and a greater need for co-ordination. A breakdown in one phase of the work flow soon stopped the whole operation. . . . Since various subunits contributed to different stages of the input, it was necessary that a central control unit be aware of any deviations that occurred. Consequently, final responsibility and control was vested in a very few positions. This shift toward more centralized control and decision making was required to handle the new level of co-ordination necessary to maintain what was obviously a more efficient system. On the other hand, such centralization ran directly counter to the company's philosophy of participation—one of its principal objectives being the delegation of responsibility directly to first-line supervisors." (*op. cit.*, p. 252.)

The EDP Elite

Indictment: The final indictment Miss Hoos makes that will be examined here is that a new EDP elite has burst on the organization scene and has been pretty much a law unto itself up until the present time. In her own words, "the elite group of computer people are, in many ways, rebels . . . they resemble the entrepreneurs of a half century ago. . . . For them, the basic ingredient of success is efficiency and not popularity. . . . Theirs is an electronico-centric universe from which emanate the waves of change . . . the EDP department designs its own projects, initiates such changes as it deems advisable, hires its own personnel, and even instructs the training department on methods of teaching . . . it bypasses channels and cuts across departmental lines—all for the purpose of enhanced efficiency. . . . EDP executives pre-empt industrial relations functions which might conceivably facilitate adjustment on the part of the employees, yet ignore the turmoil brought into these people's lives. . . . This failure to recognize the worker's point of view typifies most EDP executives in firms I have studied. Their replies to questions about personnel problems generally reveal great ambivalence. On the one hand they are extremely sensitive about such matters as displacement. . . . On the other hand, they report enthusiastically that a vastly increased volume of business is being handled without added staff." (p. 109) Further, she claims, at a time when an anti-human relations climate is flourishing in American business, EDP executives are assisting in the devaluation of the services of the industrial relations department.

Curiously enough, little is found about the EDP personnel in most of the literature. Anshen, in the article previously mentioned, said that they will occupy positions of increasing importance in the organization and have a relatively large influence on "the whole system of information processing and decision making." He says, however, that they will not take over fundamental top management responsibilities nor will they "constitute a reservoir from which top-management personnel are drawn." (p. 54)

Whom Should We Control?

One of the problems is that people tend to be confused on just who the EDP people are and generally what they do. Ronayne in his article defines the specialist groups involved in EDP: the *systems analysts*—they determine exactly what problem is to be solved and through "fact-finding" decide whether it can be handled economically and efficiently by a computer and, if so, flow chart a general systems approach to the program; the *programmers*—they work out the logical mechanical sequences of the problem and instruct the computer how to make comparisons, decide, compute, and repeat the same operations with different data; and the *computer operators*—they carefully monitor all operations of the EDP system and route data down various electronic paths to the CPU (central processing unit) for processing and switching to other places.

For the purposes of his article, Ronayne does not consider key punch operators as EDP personnel, nor do most of the other authors, which raises some problem in determining the personnel effects of ADP. The U.S. Civil Service Commission, for example, in its digital computer systems position classification series lists five ADP positions: digital computer systems administrator, programmer, equipment operator, analyst, and peripheral computer equipment operator (mostly accounting machine operators).

It is plain to see from Ronayne's description of the three specialist groups that the individual who Miss Hoos is wary of is the systems

analyst. In the present stage of development of ADP, it is really inaccurate to point to a single systems analyst group and look for a clear set of characteristics. It is a fluid situation where need has far outstripped supply, and systems analysts overlap into programming and vice versa and, in some cases—Pennsylvania, for example—the two are combined into a programmer-analyst class. The fact that one of the major questions discussed in the literature on ADP is whether to train organization people to be analysts and programmers or whether to obtain persons specifically trained in those specialties may indicate a partial solution to the problem. That is, in the great expansion of ADP that is coming, characteristics of ADP people that Miss Hoos is complaining about may be considerably watered down by the influx of individuals with different backgrounds and training.

Although there is little discussion of the problems caused by the new "electronic organization man," there are some observations that can be made that may point out a few actions that might help alleviate the problem. In these early days of the ADP revolution, two major classes of persons seem to be involved in the application of the technical aspects of ADP to organization problems.

The first class includes persons whose background is in engineering and the physical sciences, including mathematics. These individuals grew up with the computer and were responsible for its development. They have been trained in the physical sciences and engineering, for the most part, where they deal with "things" in a rational way, where predictability is expected, where mechanical efficiency and the Rule of Occam's Razor are the prime objectives. One of the major questions that has been under discussion for some time in the higher education of scientists and engineers has been their preparation for a future role in modern organizational society where they will have to deal with people. It is little wonder that this group has caused some of the difficulties indicated. They and the people they have wounded are casualties of an engagement in a larger battle in society.

The second class of persons drawn to working with ADP in organizations includes the many different kinds of organization analysts. There is probably a self-selection process involved here where the ADP problems have drawn organizational analysts who are in tune with the clean rationality of the electronic equipment and who can get taken up with the technical difficulties of fitting the problem to the equipment. Until the advent of the human relations oriented organization analyst, using the terms loosely, the organization analyst group was notorious for their underestimation of the human problems of designing efficient organizations. Thus, the systems analysts are in large part a machine-oriented self-selected subgroup of a larger group which previously had manifested some inability to understand the significance of the human being in that system we call organization.

Without doubt, there will be a rush to fill the systems analyst gap, and systems analyst training programs will bloom and flourish in many and varied training and educational gardens. Already, Ronayne reports, some DOD agencies, John Diebold and Associates' Management Sciences Institute, the American Management Association, the Systems and Procedures Association, and IBM are moving to fill the need for systems analysts. Filling the need for technicians is not the problem and has never been for any specialty more than a temporary problem. The problem is what kind of systems analysts do we want and how do we get them? What must be remembered in the preparation of systems analysts is that Cornog's First Law of Specialization is operating here where "The demands on an organization's top generalist administrators are directly and geometrically related to the narrowness of the specialists whose actions he must coordinate."

Summary Comments

The evidence seems to indicate that we have experienced only the simplest and easiest applications of ADP to the office until now and that job displacement has been reduced by absorption into the still expanding clerical force. However, the real revolution in ADP will operate to reduce those very functions that have brought on an increasing clerical work force and the future should see a serious problem of white-collar job displacement.

In addition, for the same reasons the future should see a continuing movement of ADP into the area of middle management functions and will raise a number of serious problems here. Certainly management training will be-

come an increasing problem and we can probably look for an increase in the importance of the internship and of computer simulation as training techniques.

Finally, Pfiffner and Sherwood are probably correct when they say that ADP permits either centralization or decentralization. However, observation of the reaction of managements toward innovations in the past leads to the conclusion that all except the most unusual and exceptional managements will probably prefer to keep control in their hands, especially in the government service where political repercussions of organization actions are so greatly feared. Thus, the future will probably see a trend toward greater centralization of organization control accompanying the advancing ADP revolution.

Future of ADP in State Government?

Edward F. R. Hearle and Raymond J. Mason look at the future of ADP in state government in the Winter 1961 issue of *State Government* and come up with some very difficult requirements that state governments must meet to prepare for the advantages of the electronic data equipment of the 1970's. They point to the spectacular successes of the limited applications of ADP until now, and then say that "even greater promise lies in applying computer capability to the problems of management planning and control." ("Data Processing: Its Future in State Government p. 49.)

"Managers of state government operations must make a thorough analysis of the entire range of their decisions," they continue. The authors maintain that management planning and control decisions, though apparently complex, can by careful analysis be reduced to a long series of relatively simple component decisions that computers could make. If the computer capability of the 1970's is to be effectively utilized, "Major effort in the next decade must be given to the identification of relevant data and the explicit statement of decision rules and criteria. . . ." (p. 50)

The second requirement Hearle and Mason discuss is related to the enormous storage capacity capability of future computers. The coming of computers with such data storage capacity will require a "*comprehensive* review of the information resources and needs of the state government *as a whole.*" With these computers the major data storage files of the individual agencies in any state government would have to be combined within a central computer storage unit to effectively use the equipment.

The authors maintain that these requirements demand the development of new organizational entities qualified and equipped to undertake such a comprehensive review. This is the way they describe the individuals who should make such studies. "Those making this comprehensive information review," the authors say, "must be thoroughly familiar with state governmental functions and have an understanding of the EDP equipment capability of the future. They must have allegiance not to any single departmental or functional organization, but to the central administrative group in state government. They must be prepared to spend several years in exhaustively thorough study." (p. 51)

ADP, Work Environment, and Satisfaction

While the installation of electronic data processing equipment in a medium-sized insurance company caused substantial changes in work methods and assignments in some departments, others were not much affected, according to a research report by Einar Hardin, Michigan State University. He compared affected and unaffected departments after installation "concerning perceived computer impact on employee jobs, perceived net change in a series of job aspects, feelings about computer impact and about net change, and overall and specific job satisfaction." The affected departments report more computer impact but showed few significant (statistically) differences in the frequency and net change. Employees in the two groups also differed little in feelings about perceived computer impact or about net change in job aspects. More dissatisfaction was shown by employees in affected departments, but the difference was also small. The author concludes that revolutionary though ADP may be technologically, it "causes changes in work environment and job satisfaction very similar to those which occur normally and without computer automation." ("Computer Automation, Work Environment, and Employee Satisfaction: A Case Study," 13 *Industrial and Labor Relations Review* 559-67 (July 1960).)

Not Going to Have None of That Jazz Around Here

"Government Automation Posing Threat to the Patronage System" says a headline in the *New York Times* (September 13, 1960), as a special Washington correspondent reported the issuance of the *Report on the Use of Electronic Data-Processing Equipment in the Federal Government*, noted previously. In the piece this imaginative writer saw the "statesmen and politicians" in Washington being concerned that ADP "imperils the patronage system" and that they were torn between "the desire for increased efficiency and a fear that the patronage system will be wrecked." The only difficulty with this writer was that he wasn't imaginative enough to see that by the time the patronage system is wrecked, the computers will be running for Congress anyway.

Odds and Ends About ADP

John Diebold's statement to the Subcommittee on Automation and Energy Resources of the Joint Economic Committee of Congress in the report *New Views on Automation* 1960, pp. 79-143 is interesting and a valuable report on the state of ADP. What follow are some items from that statement.

"The problem, it would seem, is much broader than simply to 'control' automation through special legislation. We cannot 'legislate' automation into existence, just as we cannot legislate its disappearance. Automation is a philosophy of technology—a set of concepts. In itself, it only makes available to us the knowledge of how to better satisfy our material and intellectual desires. Automation does not 'cause' anything. . . . My personal belief is that the prevailing fear of automation and technological change is totally misdirected. If there must be concern over change, it should be directed towards our own actions in coping with change. (p. 82)

". . . According to my firm's estimates there were more than ten thousand computer systems installed by July 1960; this includes 6,717 card calculators. . . . Of this July 1960 total, about twenty-eight hundred were small computer systems. We have estimated that more than forty-five hundred systems are on order. (p. 85)

"Automation is more than a series of new machines and more basic than any particular hardware. It is a way of thinking as much as it is a way of doing. It is a new way of organizing and analyzing production, a concern with the production processes as a system, and a consideration of each element as part of the system. (p. 91)

". . . The more I have engaged in the actual application of automation to industry and government, the more convinced I am that the fundamental importance of automation is not so much the connecting of machines as it is the ability to create automatic information and control systems. . . . The truly great gains from automation come when it extends the range of man's capability by permitting him to undertake new tasks and reach hitherto unattainable objectives. (p. 93)

". . . There seemed to be less feeling of success applying the computer where more complex management problems arose (improvement in employee morale, for example) and where there was greater need for management science (long-range decisions) techniques. These problems rather than the equipment have been the major stumbling blocks to successful automation—these, rather than any technical problems that may have developed. Technical developments, new machines, and all the results of competition and new ranges of equipment are all of no avail unless they are properly applied. For a long time, it has been this area of application that cast a shadow over the data processing field. (p. 99)

". . . We are now faced with a new generation of computers with new capabilities. Generally, the new computing machines have the following attributes: *(a)* Greater Reliability. Machines will make even fewer mistakes (if this is conceivable) and they will be in operating condition in a greater proportion of the time. *(b)* Costs of installation will be lower, partly because the machine systems are smaller and partly because of the fewer environment requirements for the installation. *(c)* Lower Cost Per Unit of Performance. This has several additional implications. The greater speed of processing will permit applications that were impossible before for economic reasons. *(d)* Greater Flexibility. One machine is now able to serve many more functions than before. For instance, it is, at least from a technical viewpoint, much more reasonable to combine scientific and business applications than it was before." (p. 117)

Comment and Critique

Brief letters on *Review* articles and other public administration matters, selected for general interest, stimulating ideas, and thoughtful content. Letters are welcomed by the Editors.

Averting the Crisis in Employee Development in the Federal Service

From the vantage points of twenty continuous years' experience as a training specialist in the federal civil service in Washington, nine years' experience in providing a clearing house service for the Training Officers Conference to bring prospective employers and candidates for employee development officer positions together, and five years' experience teaching classes in employee training and development in the Graduate School of the U.S. Department of Agriculture, the writer has made a number of observations bearing on the current crisis in filling employee development officer openings in the federal service in Washington. The same observations may apply in other metropolitan areas where there are large concentrations of federal administrative activity.

Observation. There is no reservoir of experienced talent in employee development available to agencies, yet nearly all requests are for persons who can qualify at the GS-11 ($7560 per annum) or above level.

Observation. Individuals are entering positions in the employee development officer field from assorted sources—teaching, psychology, vocational education, counseling, industrial relations, and miscellaneous personnel specialties such as employee relations, placement, and position classification. A few come from the Federal Service Entrance Examination registers, and some are working their way up from the trades and crafts and the clerical ranks.

Observation. Newly appointed employee development officers need substantial indoctrination and guidance in effective career development processes, in methods of identifying training needs, in evaluating the results of training, and in managing whole employee development programs.

Observation. The vast majority of agency situations in which an employee development officer is employed, particularly at the Bureau level, have no provision for a second position. When the employee development officer is lost, there is a vacancy until a replacement can be found. Hence, there is no natural training ground for inexperienced employee development officers.

Observation. Where employee development officers fail, due to inexperience and immaturity in the employee development work, they suffer a serious career setback. Moreover, the function of employee development and, therefore, the basic operations of the organization suffer an irretrievable loss. The employee development function may slip progressively into oblivion in such places unless an exceptionally strong individual appears to pull it out.

The Government Employees Training Act is nearly three years old. The momentum caused by this new emphasis on employee development is now cresting—like rushing waters after the thaw—at a level which may be impossible to control with the experienced hands available. It is hardly fair to the employers, the trainees, or the employee development officers to throw into the breach persons who are ill prepared. Something needs to be done—and quickly.

Something is being done by the educational institutions in the area. Each has a course which provides an orientation to the employee development function and to some of the methods being used. Some of the larger agencies have reasonably good career ladders in their staff offices which can help supply the employee development officer needs at the operating level. The Commission has contributed through its interagency training program, career placement service, and examining facilities. These efforts, though dedicated and well directed, are not enough.

Suggested Solution

The following concrete suggestion for solving this problem is offered as a point of departure for the concerted effort that is necessary to meet the pressing need.

This suggestion starts with the assumption that a reservoir of carefully selected and trained persons earmarked for employee development officer positions is needed. It also recognizes the Management Intern register as a primary source. It is a roster of well-educated, intelligent individuals who have passed the Federal Service Entrance Examination and the oral examinations which are prerequisite to placement on the Management Intern register. The Civil Service Commission as the central manpower agency should budget eighteen to twenty-four months ahead for a group to be allocated to employee development work of, say, twenty management interns, with the close cooperation of predetermined agencies. The group oral panels could be made up of persons from the cooperating agencies. Each of these agencies should agree in advance to absorb its proportionate share, at least, of the twenty management interns during the last six months of the 24-month period following their selection as employee development officer trainees. Trainees should be appointed at GS-7. They should be promoted to GS-9 after six months of successful training, and should remain at that level until picked up by one of the participating agencies at GS-11.

The Commission should assume responsibility for their eighteen to twenty-four months of training and work experience, all of which presumably would follow the well-established format of the management intern training programs which have been running since 1945. The one exception might be the limitation of work assignments to the offices of employee development officers in the participating agencies. The usual orientation, academic course work, reading and writing disciplines, counseling, and evaluation should be a part of the plan. Escape clauses in an otherwise binding training agreement might permit the Government to drop from the program any individual who loses interest or fails to show sufficient progress and let any trainee move into another career field should he seriously desire to do so.

This proposal has budget implications. All worthwhile ventures cost something in money, time, and effort. This suggestion would cost approximately $10,000 in salary per trainee during the training period. This is not an insoluble problem for a task group of skilled budget analysts with the encouragement of staff agencies and prospective participant agencies. The first point for such a group to consider should be the fact that the trainees would be doing productive work virtually throughout their training period.

This proposal offers some incidental values besides the main one of creating a reservoir of employee development officer candidates. It could serve as a demonstration project for other personnel and management fields. By stimulating more use of the premium Management Intern register, a corridor could be established for bringing more high-potential persons into the Government service. We have long accepted the concept of a military reserve. This could help establish the concept of a career administrator reserve. The best gain of all would be in terms of the improvement in the caliber of employee development officer personnel, who in turn could have a significant impact on the quality of the public service generally.

James G. Stockard
International Cooperation
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Editorial Comment

SCIENCE AND THE PUBLIC ADMINISTRATOR

A WARNING is necessary that what follows is an editorial and not a book review. The point of departure, however, as well as the point of view are largely affected by the writings of the British physicist turned novelist, Sir Charles P. Snow. Incidentally, Snow has been much involved in British public administration. During World War II, he selected scientific personnel for war research in Great Britain. From 1945 to 1960 he was Civil Service Commissioner. Since 1947 he has been a director of the English Electric Company. In view of this extended public service, Snow's Godkin Lectures at Harvard constitute food for thought for public administrators.

The lectures (published as a small book, *Science and Government**) are largely concerned with the conflict between two British scientists, Sir Henry Tizard and Professor Frederick A. Lindemann, later Lord Cherwell. Tizard, a highly placed civil servant, was, in the pre-war years, chairman of the Committee for the Scientific Study of Air Defense. Lindemann served on the Committee as a placeman of Winston Churchill. Although a member of the majority party, Churchill was simply a back-bench critic of the Government's defense policy which he viewed as quite inadequate to meet the threat of the rising Hitler. Snow lectures as an administrative historian, although reviewers have accused him of permitting his novelist flair to overcome the needed objectivity. He maintains Lindemann made the Tizard Committee's proceeding with its commitment to radar as the best defense mechanism so difficult that the Committee had to be reconstituted to exclude Lindemann. If this had not been done and had Lindemann prevailed, it is suggested the anti-Nazi crusade might not have survived and proceeded to victory. Long before victory came, Tizard was relegated to relative obscurity and Lindemann, Winston Churchill's intimate friend, became the Prime Minister's chief science adviser. Snow then describes how the elevated Lord Cherwell became overcommitted to strategic bombing, attributed to a weakness for gadgets and his faulty statistics. Snow indicates that the "hero" of his lecture, Tizard, and other scientists tried to expose the fallacy but without the success required.

From this well written, king-sized case study, a number of conclusions are drawn by the versatile Sir Charles. Tempting as it is to enumerate some of them, such as "I think it is dangerous to have a solitary scientific overlord," this is not our purpose. Read the eighty-four pages.

The book simply makes plain, as do almost daily events in government at every level, the all-prevading importance of science in modern government. Important as science is in relation to defense, it is by no means the only example where dependence upon it and the proper organization of science within public administration may be a life or death matter. If public administrators are to be effective generalists in our day, not to mention the future, they should heed an earlier conclusion reached by Sir Charles Snow in another little book, *The Two Cultures and the Scientific Revolution* (The Rede Lecture at Cambridge, 1959). Therein Sir Charles points to the great gulf today that lies between the men of science and the rest of us—especially those who are called literary or "intellectual" and, we might add, even administrative generalists. The lack of communication between these two broad cultural groups could be fatal to the Western World.

So far as the profession of public administration is concerned, every effort must be made by practicing and potential administrators to understand the interaction of two key elements: the scientists and the scientific subculture in which the scientist operates. The education of present and future administrators should begin with an examination of the nature of the activity that we call science. An intensive study of the history and philosophy of science should be required. The public administrator stands to gain much from the

* Harvard University Press, 1961.

study of recent scientific developments or an intensive study of one of the fields of physical science.

Several benefits are to be expected. Knowledge of the process itself will be but one outcome. Another will be that administrators tomorrow more quickly than those in the past will appreciate the likely effect upon public policy of scientific research and its revolutionary results. Still another will be an easier working relationship between the administrative generalist and his specialized scientific coworkers who will be more ubiquitous in all levels and departments of government in the future.

JOHN A. PERKINS
Editor-in-Chief

Half-Dressed Truth?

. . . As Sir Ian Hamilton, who later became famous at Gallipoli, wrote in "A Staff Officer's Scrapbook during the Russo-Japanese War":

"On the actual day of battle naked truths may be picked up for the asking; by the following morning they have already begun to get into their uniforms."

—Quoted by HANSON W. BALDWIN, *New York Times*, March 20, 1961, p. 5.

FACILITATING INTERGOVERNMENTAL COMMUNICATION

COMMUNICATIONS, as defined by one author, is simply the process of passing information and understanding from one person to another. This simple definition conceals a very complex process with many problems—problems that concern factors recognized only recently. Fifteen or twenty years ago the word "communications" would have been interpreted as referring to the telegraph, telephone, or radio. Today, with the increase in knowledge about people, the definition immediately calls to attention the fact that there are two people involved in the process of passing information and understanding and that both of these people are crucial to communicating.

In discussions of communications in public administration, attention has been directed primarily to communications inside the organization. But, while great changes have occurred in our understanding of the effect of communications on Mr. Organization Member's actions, there have also been accompanying changes of equal significance going on in society that have added a new dimension to the communications problem. We find that a revolution is occurring in the size, complexity, and interdependence of organizations. The result is a communications problem that no single governmental organization can solve by its own efforts. No single governmental organization at any level—federal, state, or local—can communicate wholly the kinds of things that build the individual attitudes necessary for successful cooperation among the administrators who do the day-to-day work of making our modern intergovernmental society work.

Each government organization must work at building these attitudes and what they do helps, but their efforts to obtain motivation for this kind of cooperation need to be strongly supplemented by a professional spirit among all administrators based on awareness of the need for such cooperation and the obstacles to achieving it. Professional education helps, and as we increase the broad professional preparation of our administrators, both pre-service and in-service, understanding of the obstacles to cooperation will increase and the motivation toward intergovernmental cooperation will increase. The pressure of the immensity of the problems themselves will help. People do what they have to do, most of the time, to solve problems facing them, and interorganizational cooperation between levels of government will grow out of pragmatic solutions to specific problems.

However, a vehicle is needed to ease and enhance the role of each of these factors in helping the growth of the desire to cooperate in individuals working at the different levels of government. That vehicle is present in ASPA where the mutual recognition among individual members that each has the goal of improving public administration helps create the basic trust necessary for effective communication among people. Participation in ASPA activities makes it more possible to get to work on the problem of understanding what the intergovernmental difficulties are and of creating possible solutions to those difficulties. Such participation is particularly important when it is remembered that the membership of ASPA includes not only practitioners from federal, state, and local government but also the key people in the broad professional training of prospective public administrators going into all levels of government—the educators and the students.

The value of an organization to society is measured by the contribution that organization makes to society. ASPA, by facilitating the solution of the problem of intergovernmental cooperation, is making a significant contribution.

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